

THE FURS OF ALASKA.

Of the various industries of Alaska the fur-trade is one that may be discussed in a satisfactory manner, because we have authentic records of shipments, prices, and management reaching to the beginning of this and even to the middle of the last century. At the Siberian ports of Okhotsk, Bolsheretzsk, and Petropavlovsk regular and generally reliable registers were kept of all furs arriving from the east, including the islands as well as the coast of the American continent. The figures obtained from these records may safely be considered below rather than above the actual numbers, because, as the Russian government exacted a tithe or other percentage from all shipments, some shippers endeavored to smuggle through as much as they could without reporting it.

Even at this late day it is possible to apply a check to the totals of importation of furs from the region now called Alaska, by comparing the same with equally authentic figures of transactions in furs and teas on the Chinese frontier, and at Irkutsk, the center of the trade of all Siberia.

Of the large number of furs, principally sea-otter, that found their way to Europe or China directly in the vessels of American and English traders toward the end of the eighteenth century and in the beginning of the nineteenth we have full statements in the published journals of these vessels.

Only two instances of shipments of furs from Alaska to France are known—the famous expedition of La Pérouse, which touched this coast in the year 1788, and the trading venture by merchants of Marseilles, who sent out a ship under the command of Roquefeuille, in the year 1818. This French captain, who had sailed with the most sanguine expectations of opening a new field of operations to the venturesome traders of Marseilles, and of ultimately establishing a rival traffic to that of the East India Company, was doomed to disappointment. The poor quality of his trading-goods was one of the causes of his failure among Indians, who had for long years reaped the benefits of fierce rivalry between English, American, and Russian traders. He states in his own narrative that he looked upon the inferior grade of woolen goods with which he had been furnished in France as the chief cause of his ill-success in trading with the natives. He boasted, however, of the superior quality of French muskets, but as he confesses to having paid as much as a musket and 12 pounds of powder for a single sea-otter skin, it seems that he profited but little by the superiority of the article. After a summer's cruise among the islands of the Alexander archipelago Roquefeuille came to the conclusion that as a mere trader he could not succeed, and therefore followed the example of the Americans in organizing a hunting expedition on joint account with Baranof, the chief manager of the Russian colonies. In this venture also he met with misfortune; being fitted out with Aleutian hunters, he was compelled to sign an agreement to pay the sum of \$200 for any native who might lose his life while in his employ, by drowning or at the hands of hostile natives. In the course of his expedition 26 Aleut hunters were killed by the Hydats, on Prince of Wales island, and as the number of sea-otters secured did not exceed 200, Roquefeuille left the port of Alaska somewhat disgusted, and reported that there was no field for French enterprise on the northwest coast of America.

The American and the English explorers and traders continued for many years to hunt sea-otters with Aleutians and their bidarkas, furnished by Baranof and his successors, but as their operations were chiefly carried on along the coast of New Albion or California the results of these ventures do not fall within the scope of this report.

The English and the American sea-captains who visited Prince William sound and the Alexander archipelago previous to Vancouver's voyage reaped the most abundant harvest of sea-otters in that section of the territory, as many as 2,000 skins being secured by a single vessel in one season; and at the beginning of the present century Baranof estimated that 120,000 sea-otters were carried away by "foreigners". The prices even at that early day were remarkably high, and we find instances of ten and twelve blankets, and even \$40 in cash, having been paid for a single skin. The Russians, who were compelled to transport all their trading-goods across the Asiatic continent and then by ships from Okhotsk, were not slow to discover that it was impossible to compete in trade with their English and American rivals. The valuable animal was rapidly becoming extinct in the more accessible hunting-grounds, and Baranof concluded to extend the old policy of hunting, in preference to trading, to the sea-otter ground of the southeast. He summoned large numbers of Aleuts and natives of Kadiak, with their bidarkas, and peremptorily ordered them to proceed to his new settlement at Sitka, hunting on the way. Parties composed of 600 and 800 canoes each set out upon this perilous journey of over a thousand miles, following the line of the coast. One-third of the fleet was lost on the way. Some of the natives were surprised by violent storms in crossing the open sea from one promontory to another, while others suffered death at the hands of hostile Indians of the mainland. Those who finally reached their destination were divided into smaller parties and sent out to hunt in the intricate inlets, streams, and forests of the country. Some never returned to report either their success or their losses. The association of Siberian merchants organized in 1785 to carry on the fur-trade of the north Pacific had the favor of the empress Catharine, but the first formal charter was granted by the emperor Paul in 1799. When hunting in that region became no longer profitable the Russian-American Company continued to purchase of the Indians a few sea-otters killed by them, but, owing to the vicinity of the Hudson Bay Company, the prices paid for these skins were exceedingly high. While the Aleut and Kadiak Inuit who were compelled to hunt for the

company received but \$10 for the very best grade of sea-otter, the independent Thlinket sold the same quality for \$30 and \$40 at Sitka. The manager of the Russian company acknowledged that no profit was derived in these transactions; that the skins were purchased only to prevent their acquisition by the Hudson Bay Company.

On the Aleutian islands the killing of sea-otters was brought into system and order as soon as the Russian-American Company obtained control of the country by their charter in 1799. At first the company claimed the right to employ the Aleutian hunters in the pursuit of the sea-otter without any compensation beyond their subsistence as an offset to their exemption from imperial taxes and other duties. This profitable but unjust procedure was abolished by the emperor Alexander I, and the company was instructed to pay the Aleutian hunters for every skin deposited in the company's storehouses. The emperor's manifesto was complied with, but the price paid to the Aleutian hunters for sea-otter skins was ridiculously small; only 10 rubles of colonial scrip or leather currency being paid to the hunter for a first-class skin, and he was required to furnish his own subsistence, with the exception of a few articles of luxury—a very small quantity of flour and tobacco. Even in those early times the Russian-American Company realized from \$50 to \$100 for their skins in the markets of Asia and Europe.

When the Russian hunters and traders first advanced from the coast of Asia along the Aleutian chain of islands the expeditions fitted out by Siberian merchants, consisting of one or two small vessels, were generally absent from five to seven years, and at the end of that time returned with from 2,000 to 7,000 sea-otter skins. Their primitive crafts were of such wretched construction that fully 50 per cent. of these valuable cargoes were lost by shipwreck. In spite of these losses, however, the value of sea-otter and fur-seal skins imported through the port of Okhotsk was estimated at the end of the eighteenth century at nearly 2,000,000 rubles per annum, of which the imperial government exacted one-tenth as royalty from the hunters. Under the indiscriminate slaughter of many rival hunting expeditions the sea-otter disappeared rapidly, and when the Russian-American Company at last obtained exclusive control of the whole business the annual catch did not exceed 1,500 skins for nearly half a century succeeding their first charter, and at no time during the existence of the company was it officially reported as exceeding 2,000. The policy adopted by the Russian company was to hunt thoroughly over a certain sea-otter ground for two successive years and then let it remain undisturbed for three years following, but even under this careful management the total catch did not increase to the figure attained since the transfer of the country to the United States. Certain islands and their outlying rocks were more prolific in the valuable animals than they are at present, but the total yield of sea-otter skins is now five or six times what it was then.

It is true that we find such entries as the following in the records of the custom-house of Okhotsk in a single year: "The ships of the promyshleniks discharged at the custom-house in the year 1770 16,000 sea-otters, 23,000 sables, 2,400 black foxes, 14,000 red foxes, 25,000 fur-seals, 36,000 blue foxes, valued at 2,000,000 rubles, and the traders estimate the value of goods given in exchange at 200,000 rubles"; but it must be remembered that the entries of that one year may have been the result of the transactions of several ships during four or five years.

The imperial chamberlain, Rezanof, who visited the Russian colonies in America between 1805 and 1807, estimated the value of sea-otters exported annually from the colonies at 80,000 rubles. Somewhat later, in 1817, the artist Choris, who accompanied Kotzebue in his voyage around the world, reported the annual catch of this valuable animal as worth from 100,000 to 150,000 rubles. The official reports of the company, however, showed a much smaller estimate; but it is safe to state that from the time of Kotzebue's visit to the Russian colonies until their transfer to the United States no less than 2,000 sea-otters were placed in the market every successive year, and also that to those shipments alone was due the maintenance of Russian colonies on this continent.

Of the profits accruing to the Russian-American Company from this traffic, from 300,000 to 400,000 rubles were annually disbursed to employés in the colonies, but nine-tenths of this sum was ultimately carried to Russia, only a small fraction finding its way into the hands of the natives of the country. At present the change in the way of conducting the business is so great as to leave 50 per cent. of the value of furs, at the lowest calculation, in the territory. On the other hand, the value of furs shipped from the territory is also vastly increased.

In scanning the tables appended to this chapter the reader may easily trace the decrease or increase of sea-otters from year to year, and the great discrepancy between the yield of the present and of former time cannot fail to attract his attention. The remarkable increase of shipments in our time is due solely to the increased inducements to the natives to exert themselves to the utmost, in order to satisfy the new wants growing upon them every year. The animal certainly existed in the same numbers in former times, but whenever a large body of them moved from one feeding-ground to another no effort was made to trace or follow them up as is done now. As far as can be ascertained the greater slaughter of the sea-otter has not reduced the number existing in the Alaskan waters to any perceptible extent, and at present the shipments increase from year to year. In due course of time, however, the collapse must come, and the black cloud of prospective ruin and starvation is even now rising within the poor Aleut's limited scope of vision.

At an early day in the history of the Russian colonies in America transactions in the skins of fur-seals began to rival in magnitude those in sea-otter skins. During the year immediately succeeding the discovery of the Pribylot group, in 1786, over 500,000 fur-seals were killed by the Russian hunters (Veniaminof makes these figures 2,000,000), and the animals were almost extirpated from the islands. Fully one-half of the skins taken during that period were

thrown into the sea in an advanced stage of putrefaction, poisoning the waters around the islands to such an extent as to drive away the seals for several seasons. It was soon discovered that the Chinese merchants of the Siberian frontier placed a high value upon these skins, frequently refusing to exchange their teas for any other equivalent, but when the Russian-American Company obtained its exclusive privileges the fur-seals were so nearly extinct that the company's traffic in their skins was at first quite insignificant. The chamberlain Rezanof, above mentioned, was the first to observe the threatened extinction of the trade, and promptly applied the remedy by prohibiting the killing of seals for a period of five years. At the end of that time the shy animals had returned and multiplied sufficiently to afford a regular and reliable source of revenue. On the Pribylof islands, as on the Aleutian group, the company paid native hunters for each skin secured, but the price was out of all proportion to the value, 40 and 50 cents each being all the poor Aleut obtained for skins worth then \$40 in the Chinese market. Under the circumstances it was natural that these poor fellows did not relish life on the barren, desolate islands, and frequently asked to be relieved by other laborers.

These seal islands were early looked upon by the Russian managers as an unfailing treasury from which to draw in times of need. At the beginning of this century, when breadstuffs and other provisions were shipped to the colonies through Siberia, frequently failing to arrive at the proper time, the chief manager, Baranof, was obliged to purchase whole cargoes of goods and provisions from the English and American traders, and, having no money on hand for such transactions, he hit upon the expedient of paying in fur-seals, a currency always at hand when needed. At first this mode of payment was profitable enough, the captains accepting each skin as an equivalent for a Mexican dollar. These transactions becoming known, expeditions were fitted out in England and at New York and Boston with the sole view of exchanging cheap provisions for fur-seals at Sitka and then selling the latter at an immense profit in Chinese ports. The managers of the Russian company in St. Petersburg heard of this traffic and ordered the shipment of seal-skins to China direct on account of the company, but being continually in want of provisions the manager of the colonies could not always comply with his instructions, though he succeeded in raising the price of skins from one to two dollars.

An end was finally put to these transactions by a peremptory order from St. Petersburg to make no further payments in fur-seals. The reason for this order was a very sharp transaction on the part of a Yankee trader who had sold a cargo of provisions to Baranof at Sitka, receiving fur-seals at the rate of one dollar each in payment, and then crossed over to Kamchatka with his ship and sold the skins to the agent of the same company at that place for three dollars each.

At the time of Pribylof's discovery of the seal islands they were found to be uninhabited, and the vast numbers of seals shipped during the first decade succeeding were killed by laborers from Oonalashka and Atkha islands hired for a period of years. These Aleuts were engaged at a fixed annual salary, being relieved from time to time by others, generally at their own request. It will thus be seen that from the very beginning the Russians recognized no proprietary rights to the fur-seals as vested in the Aleuts. Subsequently, when the Russian-American Company assumed control, these laborers were allowed, and even compelled, to remain for longer periods of time, sometimes for a whole generation, as the company by its charter became sole owner of everything within the limits of the Russian colonies in America; and, consequently, every fur-bearing animal killed by natives was considered as killed for the company, payment being made in the shape of compensation for the natives' time or labor. The paragraph in the imperial charter of the company defining its rights invested that organization with full proprietary title to "all products of the sea and land, including even birds of the air, and whatever might be found in the interior of the earth".

In 1805, as already mentioned, the seal islands were visited by Rezanof and Langsdorff. The former did all in his power to arrest the indiscriminate slaughter of seals by removing one-half of the men engaged in killing, and prohibiting shipments of skins for five years thereafter. Langsdorff, on the other hand, in his voluminous reports called the attention of the imperial government to the threatened extinction of fur-seals, making the rather remarkable statement that 30,000 seals had been killed for food by the laborers on the islands, the skins being thrown away; and also that he had observed in the month of May a school of fur-seals moving southward and covering the surface of the ocean for a distance of two nautical miles. Langsdorff presumed that this abnormal movement, entirely at variance with the habits of the animal, was caused by the indiscriminate onslaught of Aleut hunters on the islands of Saint Paul and Saint George.

The measures adopted by Rezanof certainly proved effective, as only ten years later Kotzebue stated that from these two seal islands the Russian-American Company derived the most regular and ample revenue in all its vast possessions. The skins that had accumulated on the islands previous to Rezanof's arrival had been most carelessly cured by a crude process of drying over fires. Of 60,000 skins shipped from there to Canton by the ship *Neva*, 30,000 were thrown overboard within a day's sail of Canton in an advanced stage of putrefaction. Gradually, however, improvements were introduced in the management of the business and in the processes of curing and packing. The art of preparing seal-skins for the market by plucking and dyeing was an invention of the Chinese, reported by the Russian-American Company's agent at Okhotsk as early as 1799. The exact date at which this process was adopted by English furriers cannot now be ascertained, but it is safe to presume that it was early in the present century, as a regular demand for these skins in England can be traced to that time.

At a later period—about the year 1850—shipments directly to New York were made, and these continued at the rate of from 5,000 to 10,000 skins every year until the transfer of the territory.

When the acquisition of the Russian colonies was advocated before Congress no mention was made of any trade in fur-seals, but the annual average of fur-seal shipments from the Pribylof islands to England, the United States, and China from 1820 to 1867 was 42,000 skins, or an aggregate of 1,974,000 in forty-seven years.

It is not easy to explain why the Russians failed to work this "seal-mine" to its full capacity. In the reports of the agents on the islands to the chief manager at Sitka subsequent to 1820 we find a constant repetition of the statement that the seals were increasing in number, accompanied by a request for permission to kill a number of old seals for the purpose of obtaining oil from their blubber, and in one instance this request was granted, and in a year or two after the discovery of gold in California, when fur-seal oil sold in San Francisco at \$4 per gallon. The skins of these oily old patriarchs were of no value.

It is, however, altogether due to the excessive care exercised by the Russian authorities that the fur-seals did not become extinct on the islands during the years intervening between the sale of the territory and the passage of the act of Congress making the Pribylof group a treasury reservation.

By that time the accumulation of seals had become too great to be affected by the killing of over a million within three years. The present limitation to 100,000 seals per annum was based upon the most careful observations and estimates; but it has long since become evident that, as far as any danger of extirpation is concerned, the number might safely be doubled. A change of fashion may take place at any time and depreciate, at least temporarily, the product of these islands; the beauty and durability of the material, however, are such as to insure its consumption to some extent among the votaries of fashion for an indefinite period, and just so long Alaska can be made a valuable possession without reference to any other sources of wealth that may be developed within its boundaries.

The sea-otter is an exceedingly shy and sensitive animal and does not congregate in any great numbers, rarely setting foot upon the shore, unless it be for a few hours of repose upon some outlying rock or bar, and probably during the breeding season in some secluded retreat. It is found 60 and 80 miles from land, singly and in pairs; and even females with their young may be seen drifting about at that distance. Patches of floating kelp are their favorite resting-places, and in still weather the female can be seen floating on her back, holding her offspring. Some hunters with well-developed ears or vivid imagination assert that the animal gives forth a crooning sound or lullaby, hushing the baby, as it were. During a very cold winter (in 1879-'80) some sea-otters came ashore in Cook's inlet.

In former times the Aleutian hunters prepared themselves for sea-otter expeditions by fasting, bathing, and other ceremonies. The sea-otter was believed to be possessed of a very strong aversion to the female sex, and consequently the hunter was obliged to separate himself from his wife for some time prior to his departure, and also to prepare the garments he was to wear, or at least to wash with his own hands such of his garments as had been made by women. On his return from a successful hunt the superstitious Aleut of former times would destroy the garments used during his expedition, and before entering his hut dress himself anew from head to foot in clothing prepared by his faithful spouse during his absence. The hunting garments were then thrown into the sea. One old man stated in explanation of this proceeding that the sea-otters would find the clothing and come to the conclusion that their late persecutor must be drowned, and that there was no further danger. With the spread of the Christian religion among the sea-otter hunters most of these superstitious ceremonies were abolished, but even at the present day the sea-otter hunter occupies a prominent position in the community and enjoys great social advantages. Anything he may want which is not in the possession of his own family will be at once supplied by his neighbors, and weeks and even months are spent in careful preparation of arms, canoes, and implements.

The mode of hunting the animal has not essentially changed since the earliest times. A few privileged white men located in the district of Ounga employ fire-arms, but the great body of Aleutian hunters still retain the spear and in a few instances the bow and arrow. The sea-otter is always hunted by parties of from four to twenty bidarkas, each manned by two hunters. From their village the hunters proceed to some lonely coast near the hunting-ground, either in their canoes or by schooners and sloops belonging to the trading firms, a few women generally accompanying the party to do the housework in the camp. In former times, of course, this was not the case. The tents of the party are pitched in some spot not visible from the sea, and the hunters patiently settle down to await the first favorable day, only a smooth sea permitting the hunting of sea-otter with any prospect of success. In the inhospitable climate of Alaska weeks and months sometimes pass by before the patient hunters are enabled to try their skill. A weatherwise individual, here yclept "astronome", generally accompanies each party, giving due notice of the approach of favorable weather and the exact time when it is best to set out, and few Aleuts are bold enough to begin a hunt without the sanction of this individual. At last the day arrives, and after a brief prayer the hunters embark fully equipped, and in the best of spirits exchange jokes and banter until the beach is left behind; then silence reigns, the peredovchik or leader assumes command, and at a signal from him the bidarkas start out in a semicircle from 50 to 100 yards distant from each other, each hunter anxiously scanning the surface of the water, at the same time having an eye upon the other canoes. The sea-otter comes up to the surface to breathe about once in every ten minutes, the smooth, glossy head remaining visible but a few seconds each time.

As soon as the hunter spies an otter he lifts his paddle as a signal and then points it in the direction taken by the animal, and the scattered bidarkas at once close in a wide circle around the spot indicated by the fortunate discoverer. If the animal comes up within this circle the hunters simply close in gradually, beating the water with their hands to prevent the escape of the quarry; but very often the wary animal has changed its direction after diving, and the whole fleet of canoes is obliged to change course frequently before the final circle is formed. As soon as the otter comes up within spear's-throw one of the hunters exerts his skill and lodges a spear-head in the animal, which immediately dives. An inflated bladder is attached to the shaft, preventing the otter from diving very deep. It soon comes up again, only to receive a number of other missiles, the intervals between attacks becoming shorter each time, until exhaustion forces the otter to remain on the surface and receive its death wound. The body of the animal is then taken into one of the bidarkas and the hunt continues if the weather is favorable. On the return of the party each animal killed is inspected by the chief in the presence of all the hunters and its ownership ascertained by the spear-head that caused the mortal wound, each weapon being duly marked. The man who first struck the otter receives from two to ten dollars from the owner. The skins of the slain animals are at once removed, labeled, and classified according to quality by the agents of the trading firms, and carefully stored for shipment. It frequently happens that a whole day passes by without a single sea-otter being sighted, but the Aleut hunters have a wonderful patience and do not leave a place once selected without killing some sea-otters, be the delay ever so long. There are instances where hunting parties have remained on barren islands for years, subsisting entirely on "algæ" and mussels cast from the sea. On the principal sea-otter grounds of the present time, the island of Sannakh and the neighborhood of Belkovsky, the hunting parties seldom remain over four or five months without securing sea-otters in sufficient number to warrant their return. Single hunters have sold sea-otters to the value of \$800 as their share of such brief expeditions, but payment is not made until the return of the party to their home station.

As soon as the result of a day's hunt has been ascertained the chief or leader reminds the hunters of their duty toward the church, and with their unanimous consent some skin, generally of a small animal, is selected as a donation to the priest, all contributing to reimburse the owner. The schools also receive donations of this kind, and the skins thus designated are labeled accordingly and turned over to the trading firms, who place the cash value at the disposal of the priest. Rivalry in the business of purchasing sea-otter skins has induced the various firms to send agents with small assortments of goods to all the hunting-grounds, as an inducement to the members of parties to squander some of their earnings in advance.

The method of killing the sea-otter is virtually the same in all sections frequented by it.

The killing of fur-seals is accomplished entirely on land, and has been reduced almost to a science of the greatest dispatch and system. The able-bodied Aleuts now settled upon the two islands of Saint Paul and Saint George are, by the terms of the agreement between themselves and the lessees, the only individuals permitted to kill and skin the seals for the annual shipment as long as they are able to perform the labor efficiently within a given time. For this labor they are remunerated at the rate of 40 cents per animal. Life-long practice has made them expert in using their huge clubs and sharp skinning-knives, both implements being manufactured expressly for this use. These men are as a class proud of their accomplishments as sealers, and too proud to demean themselves in doing any other kind of work. For all incidental labor, such as building, packing, loading and unloading vessels, etc., the lessees find it necessary to engage laborers from the Aleutian islands, these latter individuals being generally paid at the rate of one dollar per diem.

The work connected with the killing of the annual quota of fur-seals may be divided into two distinct features, the separation of the seals of a certain age and size from the main body and their removal to the killing-ground forming the preliminary movements; the final operation consisting of another selection among the select, and killing and skinning the same. The driving as well as the killing cannot be done in every kind of weather, a damp, cool, cloudy day being especially desirable for the purpose.

As it is the habit of the young male seals up to the age of four years to lie upon the ground back of the so-called rookeries or groups of families that line the sea-shore, the experienced natives manage to crawl in between the families and the "bachelors", as they were named by the Russians, and gradually drive them inland in divisions of from 2,000 to 3,000. It is unsafe to drive the seals more than five or six miles during any one day, as they easily become overheated and their skins are thereby injured. When night comes on the driving ceases, and sentries are posted around each division to prevent the animals from straying during the night, occasional whistling being sufficient to keep them together. In the morning, if the weather be favorable, the drive is continued until the killing-ground is reached, where the victims are allowed to rest over night under guard, and finally, as early as possible in the morning, the sealers appear with their clubs, when again small parties of 20 or 30 seals are separated from their fellows, surrounded by the sealers, and the slaughter begins. Even at this last moment another selection is made, and any animal appearing to the eye of the experienced Aleut to be either below or above the specified age is dismissed with a gentle tap of the club, and allowed to go on its way to the shore, rejoicing at its narrow escape. The men with clubs proceed from one group to the other, immediately followed by the men with knives, who stab each stunned seal to the heart to insure its immediate death. These men are in turn followed by the skinners, who with astonishing rapidity divest the carcasses of their valuable covering, leaving, however, the head and flippers intact. Only a few paces behind the skinners come carts drawn by mules, into which the skins are rapidly thrown

and carried away. The wives and daughters of the sealers linger around the rear of the death-dealing column, reaping a rich harvest of blubber which they carry away on their heads, the luscious oil dripping down their faces and over their garments.

The skins, yet warm from the body, are discharged into capacious salt-houses and salted down for the time being like fish in bins. This treatment is continued for some time, and after the application of heavy pressure they are finally tied into bundles of two each, securely strapped, and then shipped.

The process by which these unsightly, ill-smelling bundles are transformed into the beautiful fabrics of fashion is described briefly in a letter written by a leading furrier of New York, from which I extract the following:

When the skins are received by furriers in the salt the latter is washed off and the fat removed from the inside with a beaming-knife, great care being taken that no cuts or uneven places are made in the pelt. The skins are next thoroughly cleansed by being stretched upon beams with the fur side up, and then a careful removal of grease or other matter attached thereto. The next step in the proceeding is a stretching of pelts upon frames and drying the same over a moderate heat. After the drying process they are soaked in water and thoroughly washed with soap. After this the fur is dried again, the pelt being kept moist, and the operator pulls out the long hair with the assistance of a dull knife. The operation—a very delicate one—is repeated several times, until nothing but the soft fur remains. The skins are then dried again and dampened on the pelt side, and shaved until a fine, even surface is obtained. Then follows the slow and tedious process of working, drying, and softening the skins by treading them with bare feet in a hogshead, with fine hard-wood saw-dust to absorb the grease. In dyeing, the liquid dye is put on with a brush, carefully covering the points of the standing fur. The skin is then pulled so as to make the points touch each other for some little time, and partially dried. The dry dye is removed and another coat applied, and the same process is repeated a number of times. A few of the coats of dye are put on, heavily pressed down to the edge of the fur; from eight to twelve coats produce a good color. The skins are then washed again and cleansed with saw-dust. The English process is said not to include the washing after dyeing.

The manner in which the proceeds of the joint labor of all the sealers are divided among them is quite worthy of attention, and in its way solves to some extent the problem of communal labor. The introduction of this rather complicated system was founded upon measures adopted by the promyshleniks, or the companies of Siberia of the last century. As an example the division of proceeds on Saint Paul island alone in the year 1879 is presented: The sum total of joint earnings was first ascertained; next the number of claims upon the fund—that is, the families, individuals, and institutions to be supported—was definitely settled. Special donations were next in order, these consisting of gifts to three chiefs or superintendents of the labor of \$150 each, \$100 each to two men connected with church service, and one annual donation of \$450 to the parsonage of Oonalashka. The remainder was divided among the church of Saint Paul, the priest of that church, 64 actual laborers and heads of families, and 14 invalids and widows, the latter being divided into three classes according to their wants. The church, priest, and able-bodied men are entitled to what are called first-class shares in the proceeds, the others receiving second-, third-, and fourth-class shares respectively. The total number of participants in the distribution of earnings by shares in the year 1879 was 82, counting the church and priest at two shares each. The sum total of earnings was in that instance divided by 82, in order to ascertain the value of one first-class share. The value of a second-class share was ascertained by deducting 10 per cent. from the first-class share, and the same rule was followed as to the third and fourth classes. In the reduction of three classes of shares a sufficient sum is left to cover all the special gifts above mentioned. In the year referred to the division was as follows: The total earnings of sealers on Saint Paul island were \$32,153 40; first-class shares, 68, of \$410 75 each; second-class shares, 6, of \$369 67 each; third-class shares, 6, of \$328 60 each; and two fourth-class shares of \$287 52 each. The special gifts conferred by unanimous consent of the community, aggregating \$1,100, have already been mentioned above. The same rules are observed in dividing the earnings of sealers on the island of Saint George, where the catch rarely exceeds 20,000 per annum and the value of shares is somewhat smaller.

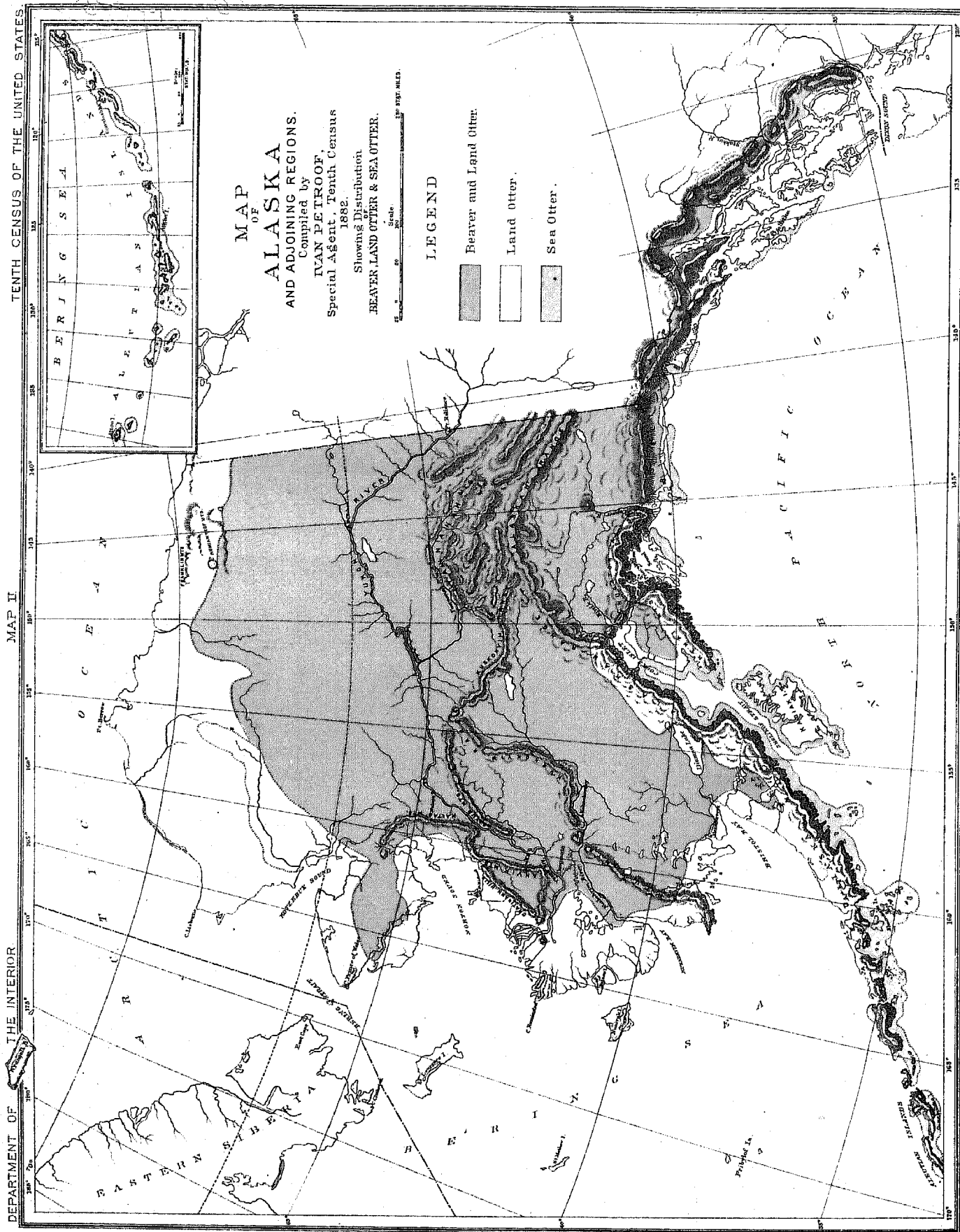
No better plan could be devised by experienced political economists to provide in a just and equitable manner for all the members of an isolated community cut off from all the means of support but the one secured for them by the government.

It is evident that the shipments of both sea-otters and fur-seals have more than doubled since the transfer of the Russian colonies to the United States. An official statement, made in 1863, concerning the shipments of sea-otters from Sitka during the period of twenty years preceding, places the aggregate at 25,899, or an annual production of 1,295. At the present date the number approaches 6,000. The distribution of the sea-otter is somewhat changed, but I know of only one hunting-ground where the number secured annually was greater in the past than it is now; that is on the island of Attoo, which, during the twenty years mentioned, produced 2,421 sea-otter skins, or 121 per annum, against 14 or 16 now obtained on the island each year. In the district of Kadiak and the Shumagin islands the yield has been increased, while at the same time sea-otters have made their appearance in large numbers at the southern end of Cook's inlet, where they were nearly exterminated almost a century since.

The increase in seals does not extend to the Commander islands, still under Russian control.

Of land-furs the records now available are less satisfactory with regard to the past. We have, however, an official statement covering the same twenty years—from 1842 to 1862—in which skins of foxes of three kinds (black, cross, and red), and from all sources, are reported as numbering 77,847, or 3,892 per annum; those of the Arctic fox, 54,134, or 2,706 per annum; beaver, 157,484, or 7,874 per annum; land-otter, 70,473, or 3,523 per annum; marten, 12,882, or 644 per annum; bear, 1,893, or less than 100 per annum. That this official statement was far below the actual yield is made probable by the fact that at the present day, after forty years of hunting and trapping, the yield of land furs is greater by many thousands of each species. The only fur-bearing animal of

NEWTON
THEOLOGICAL



this class that has decreased in numbers in our times is the beaver; and this is not due to the effects of hunting or trapping, but to several seasons of extraordinary cold, during which the submarine entrances to the beaver huts were closed by ice and the animals starved inside.

The marten or sable, though inferior to the Siberian species, is quite valuable, but the supply is limited. Whether it ever existed in larger numbers is difficult to ascertain, because the Russian company did not ship them from the colonies, but gave or sold them to the higher classes of its employés. Under the present rule of permitting only natives of the soil to hunt and trap, the balance between supply and consumption seems to be well preserved. No complaints are heard of the extinction of any fur-bearing animals, with the one exception of the beaver. As the whims of fashion change the prices of certain kinds and qualities of furs, traders induce the natives to secure those kinds in preference to others, and thus discrepancies arise in the annual catch, but this makes no difference as to the total. The fact that game, such as moose and reindeer, has been killed off to a great extent in the regions furnishing the principal land-furs would lead us to expect that the natives, deprived of their natural food-supplies, would be compelled to purchase largely imported provisions of the traders, and hunt more actively to provide means for the purchase. As far as can be observed this is the case only with regard to flour, though they seem to spend now for food money which was formerly squandered in beads and gaudy clothing unsuited to their mode of life. If extinction of fur-bearing animals in the continental region of Alaska should take place in the future it will be due entirely to the constant drain from the Arctic shore, where the Eskimos are constantly exchanging furs for whisky and other intoxicating liquors, drawing largely upon furs obtained from their neighbors in the interior as far south as the Yukon, for which they receive no return but the means of stupefying themselves for days and weeks, and perhaps a breech-loading rifle, which becomes useless in their hands as soon as the fixed ammunition is expended. The fur-bearing animals on the immediate sea-coast are almost exterminated or of little value, but the equivalent return of supplies of alcohol must be obtained, and, as a consequence, a traffic with their southern neighbors is carried on by these people, on the principle of buying furs for a little whisky and selling them for a larger quantity, the evils of this system working in both directions.

THE DISTRIBUTION OF THE FUR-BEARING ANIMALS IN ALASKA.

THE FUR-SEAL (*Callorhinus ursinus*).—The only hauling- or breeding-grounds of the fur-seal known in Alaska are on the islands of Saint Paul and Saint George, with the addition perhaps of the adjoining otter island, where these animals occasionally haul up but do not breed. From early spring until late in the autumn fur-seals are met with in all portions of the north Pacific inclosed by the Alaska coast, from latitude 54° 40' to Mount Saint Elias, and thence westward along Prince William sound, the east side of Kenai peninsula, and along the Aliaska peninsula and its continuation, the Aleutian chain of islands. In Bering sea the animal has not been observed to the northward of latitude 58°. In the spring of the year only fur-seals are found in large numbers in the vicinity of the strait of Fuca and along the coast of Vancouver and Queen Charlotte islands. During the time of the general migration to and from the breeding-grounds several of the passes through the Aleutian chain are crowded with adults in the spring and with young seals and yearlings in the late summer and autumn. The presence of large numbers of these animals in these secluded waters and those of Prince William sound late in the season (in June and July) has often given rise to the supposition that some breeding-grounds must exist in those localities, but the most minute and persistent search has failed to sustain the supposition.

About 50 miles south of the Aleutian chain large numbers of seals are frequently seen during the summer, and for half a century rumors of the existence of breeding-grounds in that neighborhood were launched from time to time.

The Russian-American Company fitted out numerous exploring expeditions, but these were always unsuccessful. The last enterprise of the kind was undertaken by a former employé of the Russian company, under the auspices of the present lessees of the seal islands, on the schooner John Bright, in 1873, being the third expedition of the kind fitted out by the Alaska Commercial Company in two years. On this occasion indications of land, such as are accepted by all navigators, were not wanting in the waters included in the search. After a season of fruitless search the captain finally abandoned his undertaking, coming to the conclusion, however, that within a short distance southward from the Aleutian islands there existed banks sufficiently shallow to serve as feeding-grounds for the seals, which possibly visit them for that purpose even during the breeding-season, as a journey of 300 miles is but a brief excursion for these rapid swimmers in search of food.

All other expeditions in search of the supposed "winter home" of these seals have met with the same lack of success. The Pacific ocean and the Antarctic have been scoured by the sealers and by emissaries of trading firms, but at the present day the fact seems to be established that the fur-seals, after leaving their confined breeding-places, scatter over the broad Pacific to localities where extensive elevations of the bottom of the sea enable them to subsist upon fish until the instinct of reproduction calls them again from all directions to one common goal.

THE SEA-OTTER (*Enhydra marina*).—The sea-otter seems to exist chiefly on a line parallel with the Japanese current from the coast of Japan along the Kurile islands to the coast of Kamchatka, and thence westward along the Aleutian chain, the southern side of the Aliaska peninsula, the estuaries of Cook's inlet and Prince William sound, and thence eastward and southward along the Alaskan coast, the Alexander archipelago, British Columbia, Washington territory, and Oregon.

At the beginning of the present century large numbers of these animals were also found on the coast of California, from which they have now disappeared altogether; and on the coast of Oregon, Washington territory, and British Columbia they have decreased to such a degree that only at long intervals is the patient hunter rewarded with the prize of one of these valuable skins. On the west coast of Vancouver island, in the vicinity of Nootka sound, where Meares, Portlock, Dixon, and others of the earliest English northwest traders found thousands of sea-otter skins in the possession of chiefs, the animal has been almost exterminated, and there can be no doubt that had it not been for the protection afforded under the Russian monopoly for nearly three-fourths of a century, this animal would be extinct to-day in Alaskan waters. The Inuit tribes alone entered understandingly into the measures of protection introduced by the Russians. The Thlinket, on the other hand, a fierce and savage people, opposed to system and order or control of any kind, were the most active agents in the extermination of the animal. From the time they began to understand the value of sea-otter skins, from the eagerness with which the early English visitors purchased all they had, even mere scraps and rags, the Thlinket all along the coast, from the mouth of Copper river southward, hunted and slaughtered the sea-otter indiscriminately and in the most clumsy manner, frightening away as many as they killed. Had these tribes joined to their recklessness the same skill and patient persistence observed among the Eskimo and Aleut there would be no sea-otters on that coast to-day; but in their wooden canoes they can only hunt in fine weather, and at such times the sea-otter retires from the coast to a distance which no Thlinket would venture.

In the Russian possessions about the Kurile islands and the coast of Kamchatka but a few hundred sea-otters are now killed annually. At three different times during the existence of the Russian-American Company their agents on the Kurile islands and Kamchatka reported the sea-otter as extinct, and each time the animals appeared again after they had not been hunted for a few years. Along the Aleutian chain the sea-otters frequently change from one feeding-ground to another; for instance, for a long series of years the island of Attou and several smaller surrounding islands furnished many hundreds of sea-otter skins every year, but for some unexplained reason a migration eastward took place, and at the present time from fourteen to twenty skins are all that the poverty-stricken inhabitants sell to the traders. The numerous islands between Attou and Atkha are each visited in turn by the hunters about once in three years, and under such management the numbers of the animals appear to remain the same. The outlying reefs of Atkha, which once furnished the most abundant supply of these valuable skins, are now entirely deserted, and the inhabitants undertake long hunting-voyages to the westward under convoy of schooners belonging to the trading firms.

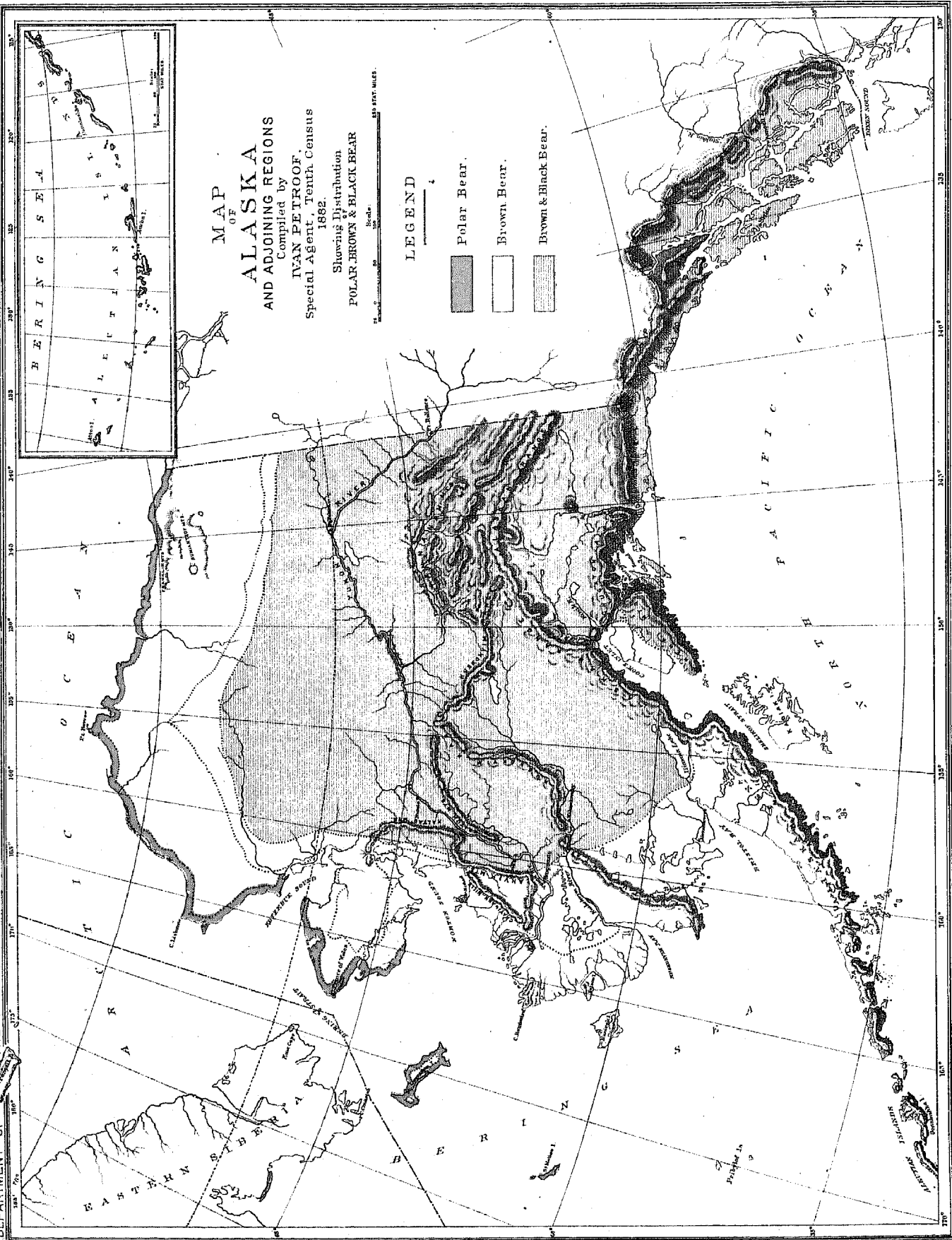
From the island of Oumnak eastward the sea-otter becomes more frequent until we find it in its greatest abundance in the district of Sannakh and Belkovsky. Here, within a radius of not more than 50 miles, over 2,000 sea-otters are secured every year by the fortunate hunters without any apparent decline in numbers. From this point in a northeasterly direction the coast of the Alaska peninsula is lined with hundreds of islands and reefs, affording ample facilities for shelter and refuge to the persecuted animal, and though it is hunted here recklessly by white and native hunters alike, using fire-arms in violation of existing regulations, no alarming decrease can be ascertained from statistics at hand. Still further northward, in the waters of the Kadiak archipelago and the southern half of Cook's inlet, and thence eastward to Prince William sound, sea-otters are found in less number than in the district described above, but still in comparative abundance, the annual yield being between 1,000 and 1,500 skins.

As far as it is possible for us to know, the only enemy of the sea-otter is man, with the exception, perhaps, of the so-called "killer-whale". We have reports of natives only in support of the last statement, but as this whale is known to make sad havoc among fur-seals there is no reason to doubt that they occasionally attack the somewhat larger sea-otter. Skins have come under my observation marked with scars produced evidently by the teeth of some large marine mammal.

The distribution of the sea-otter along the coast of Alaska, as indicated in the accompanying map, has not essentially changed within historic times. Certain localities have been abandoned by the animal altogether, others temporarily; but where Bering, Chirikof, and Steller, and subsequently the Russian promyshleniks found the sea-otter more than a century ago, we find it now, and the supply of such skins in the fur markets of the world is certainly as great now as at any time since the first indiscriminate slaughter prior to the establishment of the Russian monopoly; in fact it is apparently much greater.

THE LAND-OTTER (*Lutra canadensis*).—The land-otter is one of the most widely distributed fur-bearing animals in Alaska, ranking in this respect next to the common cross fox. The skin, however, is much more valuable, since of late it has been utilized for the manufacture of an imitation of seal-skin. The skin has always met with ready sale in Russia, where it is used extensively for collars and cuffs of the uniforms of army officers of the line, who cannot afford the more expensive sea-otter trimmings. The demand for it in former times was so great that the Russian-American Company, in leasing a strip of land to the Hudson Bay Company, was not only willing but anxious to accept payment in land-otter skins. The Chinese also have a liking for this fur.

The land-otter is found on the whole coast of Alaska, from the southern boundary to the northern shore of Norton sound. It also occurs on all the islands inside of these limits as far as Oonimak in the west and Nunivak in the north. Within the Arctic circle the land-otter is confined to the upper courses of rivers emptying into Kotzebue sound and the Arctic ocean, such as the Colville, the Kok, the Inland, and Selawik. It is found also



along the whole course of the Yukon as far as known, along the Kuskokvim, and all over the delta lying between the mouths of these rivers, in the valleys of the Togiak and the Nushegak, and in nearly all parts of the Aliaska peninsula and Oonimak island, as well as on the Kadiak archipelago, the shores of Cook's inlet, on the Kinik and Sushetno rivers emptying into the same, on Prince William sound, and on the Copper river. The traders report the land-otter also along the whole coast from Mount Saint Elias to the southern boundary, with the exception of the smaller islands.

THE BEAVER (*Castor fiber*).—The beaver was once one of the most important among the fur-bearing animals of continental Alaska, but both in supply and demand a great decline has taken place during the last half century. It would seem that the smaller demand would cause an increase in the supply, but this has not been the case. Throughout the whole interior region north of Cook's inlet and south of the Yukon river the beavers have frequently suffered from excessive and prolonged cold during the winter, the ice in rivers and ponds forming so rapidly and to such thickness that the animals found it impossible to keep open the approaches to their dwellings under water, and they died from starvation before the thaws of spring opened their prisons. The Indians of the Kinik and Tennanah rivers state that after an extraordinarily cold winter they have frequently found the putrefying carcasses of hundreds of beavers in their so-called lodges. Thousands of old beaver-dams all over the continental portion of Alaska also testify to the former abundance of the animal, which now is thinly scattered over the same ground. At nearly every trading-post throughout Alaska where beaver-skins are at all secured, hundreds are purchased now where thousands appear on former records.

The northern limit of the beaver seems to be but little to the southward of that of the land-otter—considerably above the Arctic circle—being identical with the limit of trees. Skins are obtained from the natives living on the northern tributaries of the Yukon river, which have passed into the hands of the latter from the headwaters of the Colville and other rivers emptying into the Arctic.

All the streams emptying into Kotzebue sound are still inhabited by the beaver, and it is found on the east shore of Norton sound, along the whole course of the Yukon and its tributaries, among all the lakes and streams of the Yukon and Kuskokvim deltas, in the lake and river systems of the Togiak and the Nushegak, about lake Ilyamna and the lakes and rivers of the Aliaska peninsula down to a line identical with that forming the northern boundary of the Aleutian tribe. On the shores of Cook's inlet and the rivers emptying into the same the beaver is still comparatively plentiful, especially in the vicinity of the large lakes occupying the central portion of the Kenai peninsula. Beaver-skins are also obtained from the natives occupying the headwaters of Copper river and the series of lakes connecting the river with the Kinik and the Sushetno rivers.

In the southeastern section of Alaska, west of Mount Saint Elias, traders report the existence of the beaver on streams and rivers of the mainland, but it is probable that most of the skins obtained in that vicinity come really from the British possessions, whence all these rivers flow.

In the past, when the Hudson Bay Company reigned supreme throughout the beaver country of northwestern America, the skins of these animals represented in trade the value of an English shilling each, and were used and accepted as common currency. Within the Russian possessions the value was always somewhat higher, and at the present time the price of a beaver-skin of average size in Alaska is from \$1.50 to \$2, according to weight.

The Indians of the interior and a few of the Eskimo tribes look upon the meat of the beaver as a great delicacy; it is a dish that is always set before honored guests, and is much used during festivities. The long incisors of the beaver form an important item in the domestic economy of the natives who hunt this animal, the extraordinary hardness of these teeth making it possible to use them in the manufacture of chisels, small adzes, and other tools used in the working of wood and bone. Under the rule of the Russian-American Company the exportation of castoreum was quite extensive, but now that article meets with no demand outside of the Chinese market, the Celestials still looking upon it as a valuable part of their *materia medica*.

THE BROWN BEAR (*Ursus Richardsonii*).—The brown bear of Alaska, a huge, shaggy animal varying in length from 6 to 12 feet, is distributed over nearly every section of Alaska, but seems to prefer an open, swampy country to the timber. The northern limit of this animal is about latitude 67° north, where it is found on the headwaters of the rivers emptying into the Arctic, and occasionally on the streams emptying into Kotzebue sound and in the interior of the Kotzebue peninsula. Being an expert fisher, the brown bear frequents during the salmon season all the rivers emptying into Bering sea and the north Pacific and their tributaries as far as the fish will go, and at the end of the annual run of fish the animal retreats into the recesses of hills and tundra, where berries and small game are most plentiful. The banks of all the streams are lined on either side with the well-trodden trails of these huge animals, offering better facilities for the progress of the traveler than do the paths of men. The brown bear is the great road-maker of Alaska, and not only are the swampy plains intersected with paths made by him in all directions, leading generally to the easiest fording-places of streams and rivers, but the hills and ridges of mountains to the very top show the traces of this omnipresent traveler. He shows great judgment and local knowledge, for his road up the mountain is as safe to follow as is the most practicable route. In greatest numbers this animal is found in the region between the lower Kuskokvim, the Togiak, and the Nushegak rivers, and also on the Aliaska peninsula and the island of Oonimak. The island of Kadiak is full of this species of bear, but the largest specimens are shipped from the coast of Cook's inlet. The skin of a bear that had been killed in the vicinity of the Kenai mission during last summer (1880), which I measured, was 14 feet 2 inches in length. On the steep sides of the

volcanic range of mountains, on the west side of Cook's inlet, brown bears can be seen in herds of twenty or thirty. Their skins are not very valuable, and, owing to this fact and to the fierce disposition of the animals, they are not commonly hunted. All natives of Alaska respect them, and it is the universal custom of hunters to address a few complimentary remarks to the intended victims before attempting to kill them. Perhaps the skins of fully one-half of the brown bears killed throughout Alaska are retained by the natives for bedding and to hang before the entrances of houses in the place of doors. The smaller skins are tanned and cut up into straps and lines, and the natives of the interior utilize them for manufacturing sledge-fastenings and the net-work bottoms of snow-shoes, because this leather does not stretch when exposed to moisture as moose- and deer-skins do.

THE BLACK BEAR (*Ursus Americanus*).—The black bear of Alaska is widely distributed over the continental portion of the territory, but is generally confined to regions of timber and mountains; as far as known, it exists only on a few islands in Prince William sound and on Kaiak island. The northern limit of the black bear extends, according to observations made by Mr. E. W. Nelson, even beyond that of his brown cousin. It is said to exist farther down the rivers emptying into the Arctic, and to be quite plentiful thence southward to the valley of the Yukon. The western limit of the region where the black bear is found is perhaps a line drawn from the Selawik river southeastward to Nulato, and thence across to the Kuskokvim river in the vicinity of Kalmakovsky. From the upper Nushegak many skins are obtained, and one trader reports black bear even west of this line, on the lower left bank of the Kuskokvim and on the Togiak peninsula, but as that region is not timbered the statement appears doubtful. From Bristol bay eastward the black bear is confined to the timbered regions about lake Ilyamna, but is more plentiful on the coast of Cook's inlet and in the interior of the Kenai peninsula. From the headwaters of the Yukon, Tennaah, Sushetno, Kinik, and Copper rivers many black-bear skins are brought down to the sea-coast, and from Prince William sound and eastward the mountains and forests harbor large numbers of these animals. These skins command high prices and are still increasing in value, but the animals are shy, and to hunt them requires much time and patience. The natives do not fear them in the least, and, in fact, it is considered the work of boys to kill them. Owing to its value, probably, the natives never use the black-bear skin for bedding. The glossiest and largest of these skins come from the Saint Elias alpine range and the vicinity of Prince William sound; but the black bear never attains the size of the brown variety.

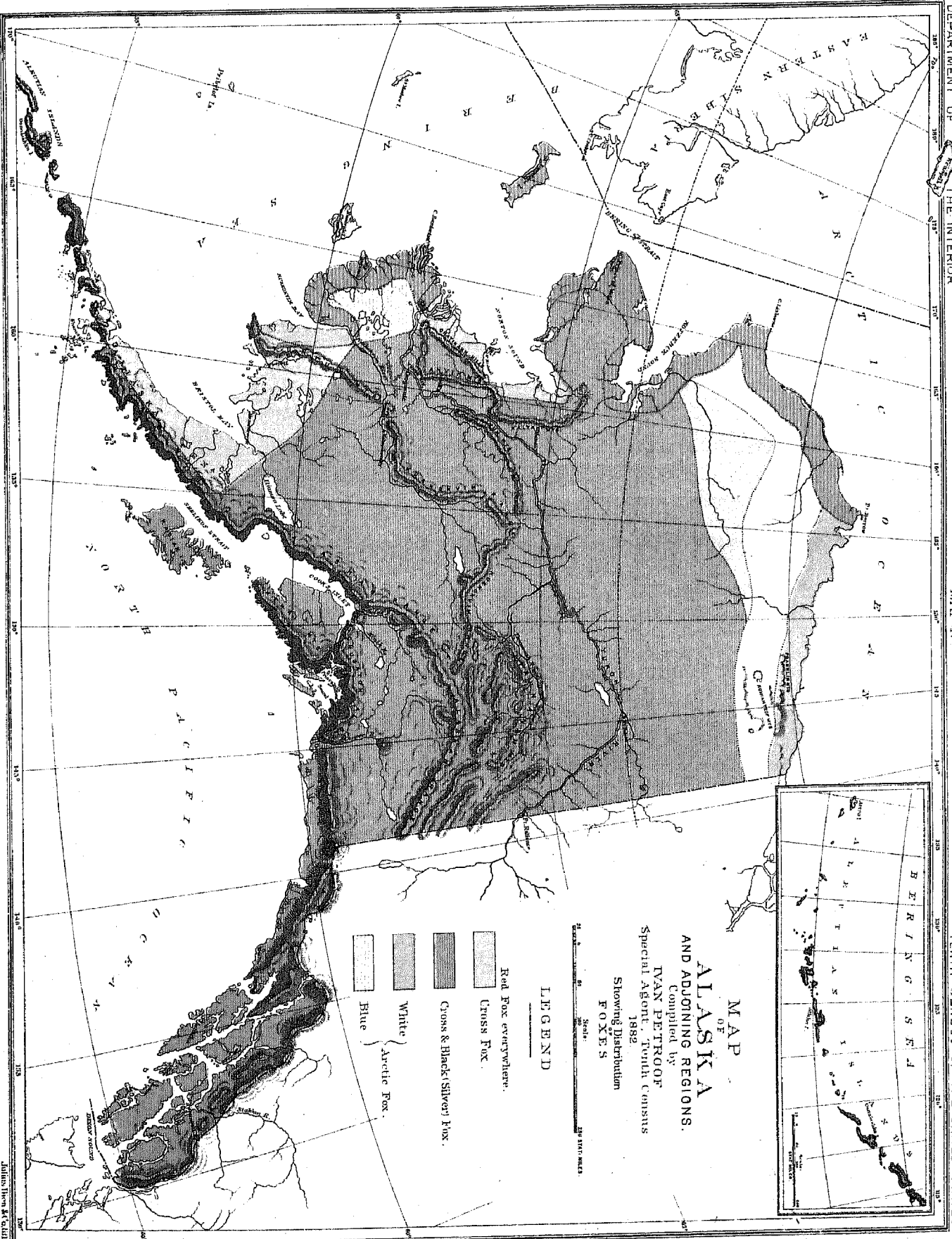
THE RED FOX (*Vulpes fulvus*).—The only fur-bearing animal found in every section of Alaska is the red fox. From point Barrow to the southern boundary, and from the British line to the island of Attoo, this animal is ever present. It varies in size and quality of its fur from the finest Nushegak variety, equal to the high-priced Siberian fire-fox, down to the diminutive, yellow-tinged specimen that rambles furtively over the rocky islands of the Aleutian chain. Its color gives variety among the uniform snow-white robes of its polar cousin along the Arctic shore, and with the unwelcome persistency of the poor relation it mingles with the aristocratic black and silver foxes, always managing to deteriorate in course of time the blood and coating of the "first families". Mountain or valley, forest or swampy plain, all seem to be the same to him. The red fox seems perfectly indifferent in regard to his diet, fish, flesh, and fowl being equally to his taste, with such little *entremets* as shell-fish, mussels, and eggs of aquatic birds. He has an advantage over his fellows in the fact that his skin is cheap, and the natives do not eat his flesh except as a last resort in times of famine. They hunt or trap the red fox only when nothing else can be obtained; the interior tribes, however, make winter garments of their skins.

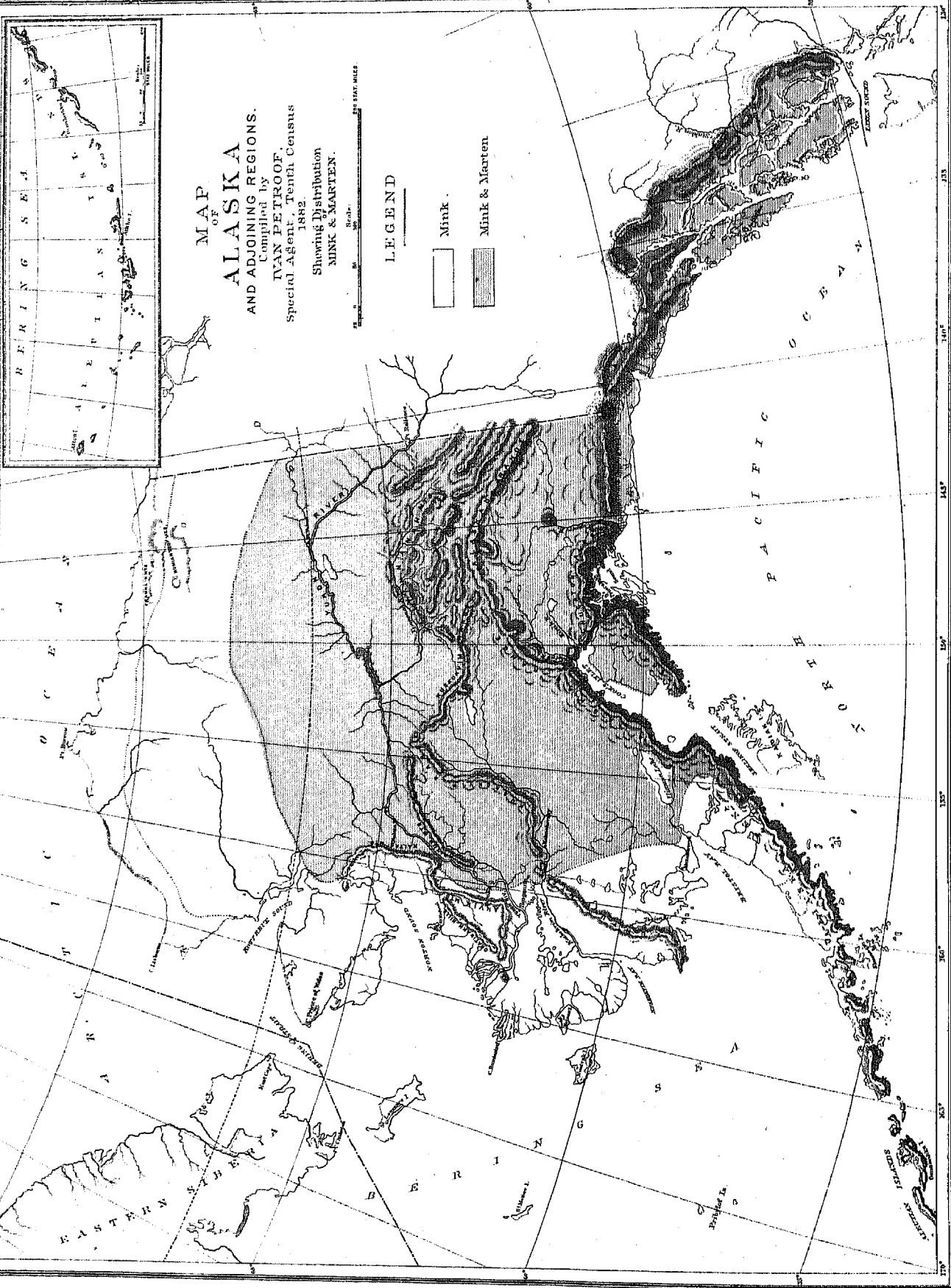
Being an inveterate and intrepid traveler the red fox is not above making an occasional sea-voyage on the ice, which explains his presence on all the islands of the Aleutian chain, the Shumagin group, and even on Saint Lawrence and the Pribylof islands, over a hundred miles from any other land. It is a common practice among both Innuut and Indian tribes in the north to make household pets of young foxes whenever they can be secured alive. The average price of red-fox skins throughout the country is about \$1.

THE BLACK OR SILVER FOX (*Vulpes fulvus*, var. *argentatus*) AND THE CROSS FOX (*Vulpes fulvus*, var. *decussatus*).—The king among the various tribes of the *vulpes* family is the black or silver fox. He is found in his prime in the mountain fastnesses of the interior and on the headwaters of the larger rivers. Here he appears of large size, with long, soft, silky fur, varying in color from a silver tint to deep jet-black, the latter being the most rare and highly valued. These two qualities are found principally in the mountains on the boundary between southeastern Alaska and British Columbia, in the country of the Chilkhats and the Takoos, on the upper Copper river, the Kenai peninsula, and on the Sushetno and Kinik, the upper Yukon, Tennaah, and Kuskokvim rivers. In the last-named regions the traders pay from \$10 to \$15 for each skin, but in southeastern Alaska, where competition is more fierce, as much as \$40 or \$50 in coin are frequently paid for a single skin. Along the Yukon and its northern tributaries the black fox of an inferior quality is found almost on the sea-coast and on the shores of Norton sound and in the interior of Kotzebue peninsula. The animal is also reported to exist on the headwaters of the Colville river up to the sixty-eighth degree of latitude. Black foxes are quite plentiful on Kadiak island; and they occur on the Shumagin group, Oonimak island, and on most of the Aleutian islands as far as Atkha, but to many of these points they have been imported through the agency of man. On the timberless highlands of the far west the fur of these animals seems to deteriorate in quality.

Another species of the fox family is generally found with the silver fox, forming, in fact, the connecting link between the red plebeian and the black aristocrat. This is the cross fox, partaking of the distinguishing qualities of both the red and black, evidently the result of unrestrained intermixture. The quality and the color of the fur

NEW ENGLAND
THEOLOGICAL
INSTITUTE





of the cross fox come much nearer those of the red, and the skin of the former exceeds that of the latter but little in value—from \$2 to \$3 being paid for the best of them. While the distribution of the cross fox is naturally almost identical with that of the silver variety, the animal is found farther westward on the Aleutian islands, and is more frequent on the Alaska peninsula, though on the islands of Prince William sound and on Kaiak island both the black and cross varieties exist.

The skins of silver foxes form the most important element in the trade of the whole Yukon basin, being almost the only high-priced skins found in that vicinity, but they are by no means numerous. The only section of Alaska where these animals are of the best quality and in large numbers at the same time is in the mountains about the Chilkhat and Takoo rivers, and there the reckless competition leaves but little margin for profit.

THE ARCTIC FOX (*Vulpes lagopus*—blue and white).—Of the Arctic fox we find in Alaska two varieties—one white and the other a bluish gray, commonly called “blue fox” by the traders. The white fox is found along the coast of continental Alaska from the mouth of the Kuskokvim northward to point Barrow and the eastern boundary. Its fur is of a snowy white, especially in the young, and both soft and long, but, owing to the lack of durability, it does not command a high price in the market.

The animal is very numerous northward of Norton sound, and not at all shy. Natives and travelers alike report instances of the fearlessness with which these foxes enter their camps, and even dwellings, in search of food or out of mere curiosity. A large portion of the skins secured by Eskimo and other natives are used by themselves for trimming their garments, and the remainder falls chiefly into the hands of whalers and whisky-smugglers, so that it is impossible to obtain accurate figures as to the annual catch. They may be called omnivorous, and they refuse nothing that will fill their stomachs. I observed one sleek and apparently well-fed specimen which devoured nearly the whole of a large salmon, and afterward worried down with considerable difficulty a thick leather strap with a heavy buckle attached to it. In the depth of winter the natives find it unsafe to leave any article of clothing, dog-harness, or boat material within their reach.

The blue fox exists now on several of the Aleutian islands, where it was found by the first discoverers in 1741. The animal is also found on the Pribylof islands, and here, where it has been possible to protect the species against intermixture with other and inferior foxes, the skins are of the finest quality, commanding a high price in the market. Traders report the existence of the blue fox to a limited extent in the vicinity of Oogashik, on the Alaska peninsula, and also on the lower Kuskokvim; and it occurs also on the delta between the mouths of the Yukon and the Kuskokvim. Captain Hooper, of the revenue marine, who commanded the United States steamer *Corwin* during two successive cruises in the Arctic, reports that he saw blue foxes at cape Espenberg, Elephant point, Hotham inlet, point Hope, point Belcher, and point Barrow. The same gentleman also states that he “found the blue fox much more plentiful on the Siberian than on the American coast, and that all the blue foxes in the far north are so inferior to those on the islands of Bering sea as to suggest the possibility of their being a different species”. Even on the Arctic coast Captain Hooper saw blue foxes, taken at the same time and place, differing very much in the color and quality of the fur. On the Pribylof islands from 1,000 to 1,500 of the best quality of blue-fox skins are annually shipped, and several hundred of a little inferior quality from Attoo and Atkha islands, but it is impossible to ascertain the quantity obtained along the Arctic coast by whalers and illicit traders.

THE MINK (*Putorius vison*).—The Alaska mink is distributed almost as widely as the red fox, but does not extend to the islands. It is most plentiful in the vast tundras or mossy marshes of the lower Yukon, Kuskokvim, Togiak, and Nushegak basins. The skin is of very little value; the Russian-American Company did not purchase it at all, and even now the trade in this article is confined chiefly to the natives, who manufacture it into garments or use it for trimming. No more than 10,000 or 15,000 of these small skins are exported annually. The northern limit of the mink is but little south of the Arctic coast, and from thence southward it is found everywhere throughout the continent until its southern and western limits are reached on the Alaska peninsula on a line between cape Stroganof and Sutkhum island. The only islands on which minks are found to exist are those in Prince William sound and perhaps some of those in the Alexander archipelago. No skins of this kind shipped from any portion of Alaska equal in quality or value those of British Columbia, Washington territory, and Oregon; the traders simply buying them for the sake of accommodating their customers. The region about Togiak river and lakes, which furnishes scarcely any other fur than mink, has for that reason been entirely neglected by traders. Until a year ago no white man had penetrated into the recesses of the tundras, and the inhabitants, having no intercourse with civilized men, are still in their primitive condition of barbarism. The natives living on the Yukon and Kuskokvim deltas are called “mink people” in derision by their neighbors—a term equivalent to beggar.

THE MARTEN (*Mustela americanus*).—The limits within which the marten is found throughout Alaska are almost identical with those of standing timber. The animal is found occasionally as far north as latitude 68°, and inhabits the valleys of the Yukon, Kuskokvim, and Nushegak rivers from the headwaters down as far as timber exists, on the wooded mountain ranges of Cook's inlet and the Kenai peninsula. On the Chugatch alps, the Copper River range, and the Saint Elias alps martens are plentiful and of the finest quality. Very fine skins of this kind are also purchased by the traders in southeastern Alaska; a portion of these probably being obtained from the British possessions. The Alaskan marten or sable is inferior to the Siberian fur of that name (“sable” is simply a corruption of the Russian word for marten, “sobol”, and is by no means a distinct animal). The Russian-American Company considered the Alaska sable of so little value that they did not export it at all from the colonies, but sold

the whole catch to officers and employes of the company. The price set upon these skins under those circumstances was small, indeed, being only ten cents each. After the transfer of the territory a demand for them arose, and in a few years of competition raised the price to \$4, \$5, and even \$6, much to the delight of the astonished natives; but the inferiority of the article soon made itself felt, and reaction set in until at the present day the price of marten-skins in northwestern Alaska does not exceed \$1 50, though in the southeastern section excessive competition still keeps up a higher figure.

A few more fur-bearing animals existing in Alaska may be mentioned, but they are not of sufficient importance to deserve more than a passing notice. The polar bear is found only on the Arctic coast, where ice in large bodies exists, and with the moving ice-fields he enters and leaves the waters of Bering sea. The number of skins annually secured forms but a very small item in the bulk of trade.

The lynx is found only in the wooded mountains of the interior on the Kenai peninsula and the Saint Elias range of mountains, the skins being used chiefly for carriage robes and trimming, but the fur is not durable.

Wolves, both gray and white, are found, but are rarely killed.

Musk-rats exist all over Alaska, but the skins are at most valueless and but few are shipped away.

Rabbits and marmots are killed only for their flesh, and occasionally the natives use the skins of the latter for the garments of the poor.

Wolverines are rarely exported, as they find a ready market among the inhabitants of the coast region of the Yukon and Kuskokvim divisions, who prefer this shaggy piebald fur to any other trimming for their garments.

EXPORTS OF FURS FROM ALASKA.

The first authentic list of fur shipments from Russian America was compiled at the beginning of the present century by Lieutenant Vassili Berg, of the Russian navy, who having access to all the archives of Petropavlovsk, Nishnekamchatsk, Bolsheretzk, and Okhotsk, included in his list all the importations from America from 1745 to 1797, with the exception of one cargo, containing nearly 4,000 sea-otter skins (the ship Vladimir, Captain Zaïkof, in 1779). With the year 1797 the systematic operations of the Russian-American Company began, though their charter was not promulgated until a year or two later, and from that time forth official tabulated statements of furs shipped from the colonies were published from time to time. Other tables can be found in the works of various authors and travelers, but it is safe to state that, generally speaking, the totals thus furnished were below the actual yield of furs. These tables, furthermore, do not include the large shipments of sea-otter furs from the Alexander archipelago by American and English traders at the end of the last and the beginning of the present century, aggregating at least 20,000 or 30,000 skins. The transactions of Baranof, the first chief manager of the Russian-American Company, who paid for many ships' cargoes of provisions and trading-goods in fur-seal skins, were also ignored, and no account was kept of losses by the frequent shipwrecks and through carelessness of subordinate employes. Thus, in one instance, the captain of the ship Nadaishda, in 1805, was obliged to throw overboard 30,000 fur-seal and several hundred sea-otter skins, which were found to have reached an advanced stage of putrefaction in the hold of the vessel. The naturalist, Langsdorff, who accompanied Lissiansky in his voyage around the world, learned from the sealers stationed on Saint Paul island that they had killed at least 30,000 fur-seals for their blubber only, the skins having been thrown into the sea for lack of time, hands, and fuel to cure them.

The incompleteness of the official Russian returns is easily demonstrated by comparison. One of these reports, covering the period from 1821 to 1842, gives the total shipments of furs as follows: Of sea-otter 25,416, or an annual average of 1,210; of fur-seal 458,502, or an annual average of 21,833; and of beaver 162,034, or an annual average of 7,716. Another partial report, yet also official, covers seven years of the same period, but shows results quite different. The annual average computed from the latter would be 1,407 of sea-otter, 18,880 fur-seal, and 5,711 beaver. The average annual yield in these furs, as computed from the company's official returns for the next twenty years, from 1842 to 1862, was 1,294 sea-otter, 13,644 fur-seal, and 7,874 beaver.

Large quantities of furs formerly found their way from the lower Yukon river and Norton and Kotzebue sounds to Siberia, through the hands of Chukche and Malemute traders, who obtained trading-goods from Siberian merchants on the Anadyr and Indigirka rivers. These Alaskan furs were, of course, not included in any estimate, nor can I now give the number of skins purchased annually along the Arctic coast by the illegitimate traders who carry rum and breech-loading arms from the Hawaiian islands and spread ruin and destruction along these ice-bound shores. From the persistency with which these men continue to assume the risks of this unlawful traffic it must be concluded that both its volume and profit are large.

From southeastern Alaska, also, large numbers of furs are carried into British Columbia, of which no record can be obtained, both natives and whites being there engaged in smuggling them across the frontier. All this goes to show that all returns of Alaska's yield of furs always have been and necessarily must be below rather than above the reality.

The annexed tabular exhibit of fur shipments from Alaska since its first invasion by Siberian fur-traders has been compiled from records found in the archives of the Russian-American Company, from Russian official reports and other publications, and from the books of the San Francisco custom-house, supplemented by statements furnished by the few firms engaged in the Alaskan trade. This table shows strikingly the extraordinary increase

in the number of furs purchased annually since the transfer of Alaska to the United States. This discrepancy may, however, be only apparent to a certain extent, and could probably be much reduced were the means at hand of ascertaining the reliability of Russian returns. The officials of the Russian-American Company were disposed to conceal the actual extent of their transactions, as the company, during the later period of its existence, was constantly striving to obtain a reduction of or relief from the vast expenditure (for administrative and protective purposes) imposed upon it by the imperial charter. Another factor in the deficiency of returns may be found in the dishonesty of subordinate employes of the Russian company, who filled their own pockets at the expense of the shareholders. It was, however, the accepted policy of the managers of the corporation to keep the wants of the natives within the narrowest possible limits, and thereby to reduce as far as practicable the quantity of merchandise required for the colonial trade, which had to be shipped around the world at an enormous expense. Since the transfer of the country, on the other hand, and since the breaking up of the monopoly, the rival traders have vied with each other in dazzling the eyes of fortunate hunters with a lavish display of costly articles of luxury and delicacies for the palate, exciting them to the utmost exertion in the pursuit of fur-bearing animals.

SUMMARY OF FURS SHIPPED FROM RUSSIAN AMERICA AND ALASKA FROM 1745 TO 1880.

By whom shipped.	Sea-otter.	Fur-seal.	Land-otter.	Beaver.	FOX.					BEAR.		Mink.	Marten.	Musk-rat.	Wolverine.	Lynx.	Wolf.
					Black.	Cross.	Red.	Arctic.		Black.	Brown.						
								Blue.	White.								
I.—UNDER RUSSIAN RULE.																	
Siberian traders, from 1745 to 1797.	90,047	417,758	1,070	.....	10,421	15,147	14,901	62,361	.....	.....	.....	.....	.....	.....	.....	.....	.....
Shelikhof company, from 1780 to 1797.	15,047	139,206	3,360	428	4,025	5,222	5,704	800	.....	.....	.....	.....	200	.....	.....	.....	.....
Russian-American Company, from 1798 to 1821.	86,644	1,767,340	17,768	56,001	15,112	24,535	35,456	45,904	5,130	.....	2,650	5,245	17,921	.....	1,234	1,819	.....
Russian-American Company, from 1821 to 1842.	25,416	458,502	20,442	162,034	17,913	26,462	45,947	55,714	13,688	.....	5,355	15,481	15,666	4,491	1,564	4,253	201
Russian-American Company, from 1842 to 1862.	25,809	372,894	170,473	157,484	21,212	23,102	33,533	32,130	22,004	.....	1,893	12,701	13,682	0,570	10	6,927	24
Russian-American Company, from 1862 to 1867.	11,137	108,718	21,816	37,409	14,310	7,942	12,316	8,062	5,119	.....	500	690	918	3,180	78	4,012	116
Total Russian shipments.	200,790	3,354,478	244,538	413,356	83,503	102,410	147,917	204,791	45,891	.....	10,468	34,217	48,887	14,241	2,886	17,011	341
II.—SINCE PURCHASE BY THE UNITED STATES.																	
By American traders, from 1867 to 1871.	12,208	338,965	6,367	17,041	2,310	6,214	31,714	4,419	4,312	121	1,910	32,100	24,311	17,908	.....	2,412	180
By American traders, from 1871 to 1880.	40,283	938,368	18,964	41,217	6,992	10,410	82,019	7,508	11,492	819	5,207	71,213	81,009	50,322	.....	6,312	421
Total American shipments.	52,491	1,277,333	25,331	58,258	9,302	25,624	114,633	11,927	15,804	940	7,117	103,313	105,920	68,230	.....	8,724	601
Grand total.....	313,281	4,631,811	269,869	471,614	92,895	128,034	262,550	216,718	61,695	940	17,605	137,530	154,307	82,471	2,886	25,735	942

With the aid of the above table a computation may be made as to the average earnings of the native hunter in disposing of his furs to the traders. The returns from the southeastern division are incomplete and partly inaccessible, and therefore the calculation is confined to the people living west of the one hundred and forty-first meridian.

During the ten years from 1870 to 1880 the purchases of furs by traders from natives aggregated—

40,283 sea-otter, at \$60, worth.....	\$2,416,980 00
18,964 land-otter, at \$2 50, worth.....	47,410 00
41,217 beaver, at \$2 50, worth.....	103,042 50
6,992 black fox, at \$15, worth.....	104,850 00
19,410 cross fox, at \$2 50, worth.....	48,525 00
52,919 red fox, at \$1, worth.....	52,919 00
7,508 blue fox, at \$2, worth.....	15,016 00
11,492 white fox, at \$1, worth.....	11,492 00
819 black bear, at \$3, worth.....	2,457 00
5,207 brown bear, at \$1 50, worth.....	7,810 50
71,213 mink, at 20 cents, worth.....	14,242 60
81,609 marten, at \$2, worth.....	163,218 00
50,322 musk-rat, at 5 cents, worth.....	2,516 10
6,312 lynx, at \$2, worth.....	12,624 00
421 wolf, at \$1 50, worth.....	631 50
Total.....	3,033,764 20

The official report of State Councilor Kostlivtsov, who was appointed in 1861 to investigate the affairs of the Russian-American Company, contains a table exhibiting the purchases of furs from natives of Alaska during a period of nineteen years, from 1842 to 1860, inclusive. This table is arranged by districts and stations, and has been transcribed in full from the Russian original so far as it confines itself to the limits of the present Alaska. The operations of the Russian-American Company embraced also a few localities not included in the transfer of territory from Russia to the United States.

SUMMARY OF FURS PURCHASED BY THE RUSSIAN-AMERICAN COMPANY IN ALASKA FROM 1842 TO 1860.

[illegible]

SUMMARY OF FURS PURCHASED BY THE RUSSIAN-AMERICAN COMPANY IN ALASKA FROM 1842 TO 1860—Continued.

Year.	Where purchased—station or district.	Sea- otter.	Fur- seal.	Land- otter.	Beaver.	Fox.	Arctic fox.	Bear.	Mink.	Marten.	Musk- rat.	Lynx.	Wolver- ine.	Wolf.
1846	Saint George island.....		1, 017				1, 418							
	Kalmakovsky.....			52	2, 091	79		10				5		
	Saint Michael.....			227	3, 623	408	132	3		47		33		
	Total.....	1, 216	15, 070	934	10, 676	2, 788	3, 866	89	100	1, 868		162	111	8
1847	Sitka.....	158		119	58	20		3		51			11	1
	Kadiak.....	251		361	3, 601	692		69	101	1, 555	152	151	55	
	Ounga.....	214		60		421								
	Oonalashka.....	186		5		1, 740								
	Atkha.....	87				27	235							
	Attoo.....	84					284							
	Saint Paul island.....		16, 708				515							
	Saint George island.....		1, 000				1, 854							
	Kalmakovsky.....			100	2, 395	236		8				49		1
	Saint Michael.....			179	3, 404	293	161	5				111		
	Total.....	980	17, 703	824	0, 458	3, 444	2, 549	85	101	1, 636	152	311	66	2
1848	Sitka.....	95		114	48	7		10	54	55		16	2	
	Kadiak.....	397		300	5, 544	1, 215		109	74	948	60	178	19	4
	Ounga.....	109		66		634				23			1	
	Oonalashka.....	230				1, 180								
	Atkha.....	113				10	130							
	Attoo.....	91					274							
	Saint Paul island.....		13, 650				461							
	Saint George island.....		1, 000				1, 208							
	Kalmakovsky.....			75	1, 949	333		14				20		
	Saint Michael.....			207	2, 740	469	13	3	20	96	490	110		
	Total.....	1, 035	14, 650	762	10, 290	3, 857	2, 176	136	148	1, 122	550	323	22	4
1849	Sitka.....	164		136	623	33		4	54	65		10	6	
	Kadiak.....	256	2	490	4, 335	2, 151		60	75	1, 270	146	269	69	4
	Ounga.....	185		74		358							1	
	Oonalashka.....	195		7		423							1	
	Atkha.....	148												
	Attoo.....	238					222							
	Saint Paul island.....		20, 450				519							
	Saint George island.....		1, 000				1, 069							
	Kalmakovsky.....			78	1, 436	298		8				15		
	Saint Michael.....			260	2, 543	637	41	2		175		124		
	Total.....	1, 186	21, 452	1, 054	8, 937	3, 900	1, 851	74	129	1, 516	140	418	77	4
1850	Sitka.....	260	1	128	430	105		13	30	200		9	9	
	Kadiak.....	292		400	4, 679	2, 145		116	69	993	210	264	122	6
	Ounga.....	236		64		439								1
	Oonalashka.....	239		1		680								
	Atkha.....	33												
	Attoo.....	298					170							
	Saint Paul island.....		6, 270				519							
	Saint George island.....		500				1, 073							
	Kalmakovsky.....			73	1, 077	285		7				28		
	Saint Michael.....			124	2, 505	793	24	22		64	686	196		
	Total.....	1, 358	6, 771	790	8, 691	4, 447	1, 786	158	99	1, 257	896	497	131	7
1851	Sitka.....	111		65	462	22		1	144	189			6	
	Kadiak.....	416		253	4, 442	1, 047		99		173	473	60	93	
	Ounga.....	200		39		514			1					
	Oonalashka.....	270		2		913								
	Atkha.....	25				90	126							
	Attoo.....	21				253								
	Saint Paul island.....		6, 064				517							
	Saint George island.....		500				1, 263							
	Kalmakovsky.....			45	1, 166	339						19		
	Saint Michael.....			157	3, 169	250	12	1	29	67	692	168		
	Total.....	1, 043	6, 564	561	9, 239	3, 437	1, 918	161	174	429	1, 165	185	99	
1852	Sitka.....	46		15	143	2				24				
	Kadiak.....	155		448	3, 196	1, 637		65		503		34	80	5
	Ounga.....	232		68		468			6					
	Oonalashka.....	233		3		1, 481								

SUMMARY OF FURS PURCHASED BY THE RUSSIAN-AMERICAN COMPANY IN ALASKA FROM 1842 TO 1860—Continued.

Year.	Where purchased—station or district.	Sea- otter.	Fur- seal.	Land- otter.	Beaver.	Fox.	Arctic fox.	Bear.	Mink.	Marten.	Musk- rat.	Lynx.	Wolver- ine.	Wolf.
1842	Atkha	91				34	243							
	Attou	123					294							
	Saint Paul island		6,225				645							
	Saint George island		500				1,477							
	Kalmakovsky			54	1,732	62						11		
	Saint Michael			116	1,720	630	77	5		46	1,152	24		
	Total	890	6,725	704	6,791	4,314	2,736	70	6	573	1,152	40	80	6
1853	Sitka	1			79			2						
	Kadiak	232		248	6,170	580		75	51	232	1,146	5	74	6
	Ounga	242		87		517								
	Oonalashka	299		3		1,167								
	Atkha	4				285	185							
	Attou	193					388							
	Saint Paul island		16,034				641							
	Saint George island		2,001				1,238							
	Kalmakovsky			48	2,640	163	113							
	Saint Michael			250	3,174	454	30	3	70	122	668	15		
	Total	1,021	18,035	636	12,072	3,175	2,595	80	121	354	1,714	20	74	6
1854	Sitka	1			23				30	21				
	Kadiak	390	1	438	654	1,534		22	8	238	167	3	46	1
	Ounga													
	Oonalashka	268		1		721								
	Atkha	9				125	193							
	Attou	74												
	Saint Paul island		24,140				624							
	Saint George island		2,000				1,291							
	Kalmakovsky			42	1,472	105						1		
	Saint Michael			442	3,855	288	4	3	1	254		10		
	Total	742	26,147	923	6,004	2,773	2,112	25	39	513	167	14	46	1
1855	Sitka	3		2	9									
	Kadiak	296		233	6,837	735		171	165	990	1,050	43	143	6
	Ounga	673		176		646							1	
	Oonalashka	338		2		820								
	Atkha	36												
	Attou													
	Saint Paul island		6,584											
	Saint George island		2,001				1,123							
	Kalmakovsky			67	965	12						3		
	Saint Michael			347	1,594	470	36	2	33	502	235	4		
	Total	1,346	8,585	847	9,405	2,683	1,159	173	198	1,402	1,285	50	144	6
1856	Sitka				15									
	Kadiak	251		506	2,176	1,015		59	3	886		76	39	
	Ounga	193		64		138								
	Oonalashka	215				344								
	Atkha	86				71	159							
	Attou	325					280							
	Saint Paul island		20,550				514							
	Saint George island		3,000				1,145							
	Kalmakovsky			88	1,161	260	99	16		450		10		
	Saint Michael			248	1,207	673	133	19	104	396	220	26		
	Total	1,070	23,550	906	4,559	2,501	2,335	94	107	1,732	220	112	39	
1857	Sitka													
	Kadiak	381		519	4,502	1,056		97	101	857	2,287	174	70	1
	Ounga	273		49		290								
	Oonalashka	403				641								
	Atkha	3				11	33							
	Attou	176					180							
	Saint Paul island		18,082				1,417							
	Saint George island		3,000				1,108							
	Kalmakovsky													
	Saint Michael			375	2,683	1,059	159			1,387	62	83	52	
	Total	1,186	21,082	943	7,245	3,057	2,987	97	101	2,244	2,339	207	122	1

SUMMARY OF FURS PURCHASED BY THE RUSSIAN-AMERICAN COMPANY IN ALASKA FROM 1842 TO 1860—Continued.

Year.	Where purchased—station or district.	Sea- otter.	Fur- seal.	Land- otter.	Beaver.	Fox.	Arctic fox.	Bear.	Mink.	Marten.	Musk- rat.	Lynx.	Wolver- ine.	Wolf.
1858	Sitka.....													
	Kadiak.....	160		442	3,120	1,864	17	78	42	1,002	2,880	208	73	4
	Ounga.....	274		51		240								
	Oonalashka.....	418		7		1,102								
	Atkha.....	32				223	228							
	Attoo.....	249					94							
	Saint Paul island.....		20,810				558							
	Saint George island.....		3,000				1,555							
	Kalmakovsky.....			95	1,280	128	8	7		352		95		
	Saint Michael.....			286	1,449	500	150	24		1,394	69	53		
	Total.....	1,142	32,810	881	5,849	3,563	2,610	107	42	2,748	2,940	356	73	4
1859	Sitka.....				32			5	22		4			
	Kadiak.....	491		557	3,178	1,420		81	41	675	1,197	94	56	1
	Ounga.....	359		44		250								
	Oonalashka.....	443				1,005								
	Atkha.....	106				195	125							
	Attoo.....	270					5							
	Saint Paul island.....		19,000				619							
	Saint George island.....		3,000				1,296							
	Kalmakovsky.....			103	1,717	757	63	10		346		52		
	Saint Michael.....			333	1,982	995	267	37		1,940	140	92	1	
	Total.....	1,678	22,000	1,037	6,909	4,622	2,375	133	63	2,967	1,341	178	57	1
1860	Sitka.....			3	88	1		11	39	7	6			
	Kadiak.....	396		421	5,413	1,988	12	26	20	527	1,184	36	68	
	Ounga.....	357		63		305								
	Oonalashka.....	478		6		870								
	Atkha.....	40				42	245							
	Attoo.....	259					59							
	Saint Paul island.....		18,500				625							
	Saint George island.....		3,000				911							
	Kalmakovsky.....			70	969	398	37	10		950		9		
	Saint Michael.....			313	1,950	895	54	46		1,536		28		
	Total.....	1,639	21,500	885	8,420	4,499	1,943	93	59	3,020	1,190	73	68	

RECAPITULATION.

Years.	Sea- otter.	Fur- seal.	Land- otter.	Beaver.	Fox.	Arctic fox.	Bear.	Mink.	Marten.	Musk- rat.	Lynx.	Wolver- ine.	Wolf.
1842.....	806	10,172	1,478	8,522	5,527	2,545	304	741	240	3,578	150	46	11
1843.....	1,054	12,171	1,608	9,924	4,006	3,302	222	102	992	80	144	10	11
1844.....	926	12,680	1,214	9,051	3,350	3,021	76	98	625	6	35	67	9
1845.....	822	13,637	1,358	8,685	3,798	1,809	127	78	985	145	100	71	17
1846.....	1,216	15,070	994	10,676	2,788	3,866	89	160	1,868		162	111	8
1847.....	980	17,703	824	9,458	3,444	2,540	85	101	1,636	152	311	66	2
1848.....	1,035	14,650	762	10,290	3,857	2,176	136	148	1,122	550	323	22	4
1849.....	1,186	21,452	1,054	8,937	3,900	1,851	74	120	1,516	146	418	77	4
1850.....	1,358	6,771	790	8,691	4,447	1,786	158	99	1,257	896	497	131	7
1851.....	1,048	6,564	501	9,289	3,437	1,918	101	174	420	1,165	185	99	
1852.....	880	6,725	704	6,791	4,314	2,736	70	6	573	1,152	40	80	5
1853.....	1,021	18,035	636	12,072	3,175	2,595	80	121	354	1,714	20	74	6
1854.....	742	26,147	923	6,004	2,773	2,112	25	39	513	167	14	46	1
1855.....	1,346	8,585	847	9,405	2,688	1,159	173	198	1,492	1,285	50	144	6
1856.....	1,070	23,550	906	4,559	2,561	2,335	94	107	1,732	220	112	39	
1857.....	1,186	21,082	943	7,245	3,057	2,987	97	101	2,244	2,339	207	122	1
1858.....	1,142	32,810	881	5,849	3,563	2,610	107	42	2,748	2,940	356	73	4
1859.....	1,678	22,000	1,037	6,909	4,622	2,375	133	63	2,967	1,341	178	57	1
1860.....	1,539	21,590	885	8,420	4,499	1,943	93	59	3,020	1,190	73	68	
Total.....	21,030	311,394	18,345	160,727	69,747	45,735	2,244	2,566	26,313	19,075	3,384	1,403	97

A comparison of the total purchases according to the above table with the total shipments as exhibited for the corresponding period of time in Table I will reveal certain discrepancies that require explanation. For instance, the shipments of land-otter skins from 1842 to 1862 aggregated 170,473, while only 18,345 were purchased of the natives from 1842 to 1860. During this period the Hudson Bay Company rented from the Russian-American Company the strip of mainland lying back of the Alexander archipelago, and, upon mutual agreement, the greater

part of the rent was for many years paid in land-otter skins, purchased in various sections of the Hudson Bay Company's domains. These skins were then in great demand for the trimming of officers' coats in the Russian army, hence the large shipments in excess of what Russian America could supply.

Further comparison of the two tables demonstrates the fact that the skins of the marten (Alaskan sable) and of the bear were rarely exported under the Russian management, being disposed of chiefly to employés of the company, and in consequence of the limited demand these animals were not very extensively hunted.

A comparison of the quantity of furs purchased during the nineteen years included in the exhibit of the above table with the incomplete returns of shipments by American traders in thirteen years, from 1867 to 1880, the latter being necessarily below the real figures, is shown below:

OUTPUT OF FURS IN ALASKA.

Classes of fur.	From 1842 to 1860 (nineteen years).	From 1867 to 1880 (thirteen years).
Sea-otter.....	21,030	52,491
Fur-seal.....	311,394	1,277,333
Land-otter.....	18,345	25,331
Beaver.....	160,727	58,258
Fox.....	60,747	149,559
Arctic fox.....	45,735	27,731
Bear.....	2,244	8,057
Mink.....	2,500	103,313
Marten.....	26,313	105,920
Musk-rat.....	19,075	68,230
Lynx.....	3,384	
Wolverine.....	1,403	
Wolf.....	97	

A contemplation of the above table may furnish food for reflection to United States officials, and might probably be of interest to the Russian government.

The prices paid to natives for their furs have, of course, greatly increased since the admission of unlimited competition to the field of operations. The subjoined comparative table of prices will present this:

Classes of fur.	Under Russian rule.	At present.
Sea-otter.....	\$10 00	\$60 00 to \$100 00
Land-otter.....	60	2 50 to 3 00
Black fox.....	\$2 00 to 3 00	10 00 to 40 00
Cross fox.....	60	2 50 to 3 00
Red fox.....	60	1 00 to 1 50
Arctic fox (blue).....	80	3 00 to 4 00
Arctic fox (white).....	20	2 00
Beaver.....	60	2 00 to 3 00
Mink.....	5	20
Marten (sable).....	10	3 00 to 4 00

Owing to competition the purchasing power of money has not decreased in Alaska in the same ratio as prices have increased. The natives in all accessible sections of the territory are now enabled to purchase necessities and luxuries of which they did not dream previous to the abolition of the Russian monopoly. The fur-seals of the Pribylot islands were never purchased of the natives; the latter were paid only for the labor of killing and skinning the animal, as is now done by the present lessees of the islands under the terms of their lease from the United States government.

The market value (London) of the annual yield of furs in western Alaska may be approximately stated as follows:

Classes of fur.	Number.	Price.	Value.
Sea-otter.....	4,500	\$100 00	\$450,000
Fur-seal.....	100,000	15 00	1,500,000
Land-otter.....	2,500	3 00	7,500
Beaver.....	3,800	3 00	17,400
Black fox.....	920	30 00	27,600
Cross fox.....	2,500	3 00	7,080
Red fox.....	11,400	1 50	17,100
Arctic fox (blue).....	1,190	4 00	4,760
Arctic fox (white).....	1,580	3 00	4,740
Bear, black.....	100	5 00	500
Bear, brown.....	711	2 00	1,422
Mink.....	10,300	30	3,090
Marten (sable).....	10,500	3 50	36,750
Musk-rat.....	6,800	10	680
Lynx.....	870	3 00	2,610
Total.....			2,081,852

Adding to this \$100,000 for the furs of southeastern Alaska, the greater part of which were sold in British Columbia, and the value of the annual fur-yield of Alaska may be estimated at \$2,181,832, which amount may be swelled a little by the Arctic fur trade, of which I have no returns.

This estimate, which is necessarily low, furnishes the best answer to the question whether the purchase of Alaska from Russia, considered from a financial standpoint, was a judicious measure.

THE FISHERIES.

Mr. Tarleton H. Bean, of the Smithsonian Institution, enumerates seventy-five species of food-fishes existing in Alaskan waters, over sixty of which Mr. Bean claims to be strictly adapted to the use of man, while the remainder come under the heading only as bait for catching the others.

Of the sea-fishes the cod-fish stands foremost in quantity as well as in commercial importance.

Within a short time after the purchase of Alaska by the United States Professor George Davidson, of the United States coast survey, stated that the soundings of Bering sea and of the Arctic ocean north of Bering strait indicated the largest submarine plateau yet known. In the eastern half of Bering sea soundings of less than 50 fathoms are found over an extent of 18,000 square miles. The extent of the banks in the gulf of Alaska, between longitude 130° and 170° and latitude 60° and 54°, has not thus far been estimated, but it is probably equal to that of the banks of Bering sea.

In general terms it may be stated that the cod-fish is found around the whole south shore of Alaska. Its distribution on banks properly begins, however, with the strait of Fuca, though it is found occasionally as far south as the Farrallones. A few schooners fish for cod in British Columbian waters, especially near the Alaskan line. The fish is quite abundant in many of the channels of the Alexander archipelago, and is found in Yakutat bay, off the southern and western shore of Kaiak island, in Prince William sound.

The first large bank after crossing the southern boundary of Alaska is found in Chatham strait, but another and smaller bank lies in Peril strait, between Baranof and Chichagof islands. The next bank of general importance is the Portlock bank, located by the explorer of that name along the southeastern coast of Afognak and Kadiak islands. The soundings of this bank are from 45 to 90 fathoms. Some distance to the southeast of Kadiak, in latitude 56° 13' and longitude 153° 30', there is another bank, with soundings of from 22 to 28 fathoms.

More to the southward is found the Simeonof bank, discovered in 1867, between latitude 54° 45' and 54° 38', longitude 158° and 158° 30', with soundings averaging 40 fathoms, and about 20 miles east-northeast of Simeonof island a little higher plateau is reported, with soundings of from 26 to 40 fathoms. The famous Shumagin banks, of which the Simeonof bank, perhaps, is an extension, are located around Nagai, Popof, and Ounga islands, within a short distance of the shore. Most of the shipments of cod-fish from Alaska to San Francisco are made from this vicinity, the banks heretofore named being worked almost exclusively for local consumption.

South of the Shumagins an extensive bank, with soundings averaging 35 fathoms, is known to exist in the vicinity of Sannakh island, between latitude 54° 67' and 54° 20', longitude 161° 55' and 162° 30', and another large bank is reported off Oonimak pass, in latitude 54°, longitude 166°, with soundings of 40 fathoms. Still farther to the southward, in the vicinity of Akutan pass, a bank with soundings of 50 fathoms was reported in 1869.

A very prolific cod-fish bank exists inside of Captain's harbor, in Oonalashka island, with shallow soundings of from 10 to 20 fathoms. The westernmost cod-fish bank definitely located in the Aleutian chain of islands extends from the south end of Oumnak island into the north Pacific, with soundings of 30 fathoms, in latitude 52° 30', longitude 168° 50'. Many more such banks exist in the vicinity of the Aleutian islands and the eastern portion of Bering sea, but these rich stores of food-fish will probably remain undisturbed for some time to come. Even the banks enumerated here are merely skimmed, as it were, of their abundant produce, the fishing being done chiefly "inshore", in dories, boats, and canoes, the schooners engaged in the business being employed almost exclusively as carriers of the catch.

The cod-fishery of Alaska may be considered as in its infancy. Since Captain Turner, of the schooner Porpoise, sailed from San Francisco in the spring of 1866, and returned in the same year, after a brief visit to Queen Charlotte islands, Ounga, and the Shumagin group, with a cargo of marketable cod-fish, the industry opened by this pioneer has not developed in such a degree as might have been expected from the almost unlimited supply and the favorable location of the banks.

As has already been stated, no deep-sea fishing, such as is carried on in the north Atlantic, exists in Alaska. In the channels of the Alexander archipelago the fishing for cod has until lately been confined altogether to the natives of the Thlinket tribes, who opposed all attempts of white men to compete with them in this particular industry. The few small sloops engaged in the business in this region depend altogether upon the inclination of these natives to exert themselves in obtaining their cargoes. These fishermen use their own appliances, fishing with bark lines and wooden iron-pointed hooks, and two men in a canoe feel satisfied with a catch of 30 or 40 fish, which they sell at a comparatively high rate to the captains of the sloops; and thus it happens that these crafts are frequently detained for many weeks awaiting a cargo that could easily have been secured within five or six days by white men.

In Prince William sound the cod-fish is only caught by natives for their own consumption at a season when no other fish can be obtained in abundance. The fishing here is from canoes within a short distance of the shore, mostly in well-sheltered bays. Perhaps one-half of the catch is consumed fresh, while the other half is split and hung up to dry in the open air, without salting or smoking. In spite of the damp climate of this region the specimens of dried cod-fish that came under my observation were apparently well cured, quite palatable, and in a better condition than salmon or red-fish treated in the same manner, the disagreeable taint which seems to be inseparable from dried fish of the salmon family being scarcely perceptible in these specimens of dried cod-fish. As the cod-fish of Prince William sound is now confined almost entirely to its northern shore, it is safe to state that the total annual consumption, both fresh and dried, does not exceed 30,000 or 40,000 fish.

In English bay, on the southwestern extremity of the Kenai peninsula, the natives fish for cod occasionally, but only when unfavorable weather prevents them from hunting outside of the limits of the bay. The cod here is all consumed fresh, and the total catch cannot exceed 2,000 or 3,000 fish.

Proceeding from here southward to the islands of Afognak and Kadiak we meet a people partially subsisting upon cod-fish throughout the year. The Portlock bank is within easy reach of all the settlements on the eastern shore of these islands, but only the most enterprising among the people, chiefly the creoles or half-castes, venture out to any distance in sloops built on the islands. The principal fishing is done close inshore in small boats and dories. The old men and the boys of the creole and Inuit families may be seen in their boats or canoes a mile or two from shore on almost any morning throughout the year, except when a furious northeaster keeps them at home. Nearly all this catch is intended for immediate consumption, as the inhabitants of this region do not dry any cod-fish. In the creole settlements of Afognak, Spruce island, and in the vicinity of Kadiak fresh cod-fish, together with potatoes grown in their little garden-patches, form the constant diet of the inhabitants throughout the year. In the harbor of Saint Paul, the central settlement of this group of islands, the cod-fish is also prepared for exportation. The favorite ground for these fishermen is a flat with soundings from 15 to 20 fathoms, and here they average a daily catch of 200 fish per man. The shipments from this point to the California market have been thus far limited to small quantities of boneless fish put up in 30-pound boxes.

The only active cod-fish industry existing in Alaska is located about the Shumagin islands, the firm of McCollam & Co., of San Francisco, having a permanent station at Pirate cove on Popof island. The force of this establishment consists of a foreman and eight fishermen, who go out in their dories during the day and dress their catch on shore in the evening. The fishermen who come up with the schooners from San Francisco generally ply their lines within easy reach of the harbors on Popof and Nagai islands. The average catch per man in this vicinity is also 200 fish, though catches of from 500 to 600 have been recorded.

Since the first opening of this industry on the Shumagin banks the total annual catch has not exceeded 500,000 fish. The best results in dory fishing at Pirate cove are obtained in the month of February. The schooner fishermen meet with good success from late in April until the middle of August, and the fishing on the deep banks of Simeonof island is best in August and September. At the latter place it has been reported that ten men caught 4,000 fish in one day, the average catch being from 1,600 to 1,800.

All the fishermen engaged in the vicinity of Kadiak and on the Shumagin banks agree in the statement that the abundance of cod-fish is as great as ever, occasional fluctuations in the catch being due entirely to migration of the fish.

Careful investigations by Professor Jordan and Dr. T. H. Bean, of the United States Fish Commission, into the quality of the Shumagin cod have shown no essential difference between this species and that of the north Atlantic. The facilities for the pursuit of the industry are greater on the Pacific side than they are on the Atlantic. The journey from San Francisco or Puget sound to the Shumagin banks is comparatively brief and very safe, and the banks are within a few hours' run of numerous commodious harbors. In view of all these circumstances the conclusion is unavoidable that the great want of the Shumagin fisheries is not fish or safety to the fishing-craft, but simply a demand for fish, and that a market such as the New England fishermen enjoy would whiten the vast extent of the Shumagin banks with sails of all descriptions. The yield of cod-fish, so far as it could be obtained from the records of shipments to San Francisco for the last few years, is given in the subjoined table. In connection with this subject it may be mentioned that fully one-half, if not more, of the cod-fish brought to San Francisco is caught in the sea of Okhotsk. The fish of the latter sea is not superior in quality, being caught early in the season and before reaching the best stage, and the quantity does not seem to exceed that caught on the Shumagin banks, while the average weight is somewhat less. The question arises, why do San Francisco fishermen go to the Okhotsk sea at all?—a question which must be left for future investigators to solve.

The shipments of cod-fish from the Shumagin islands to San Francisco in the year 1880 consisted of seven cargoes, aggregating 432,000 fish and weighing 1,728,000 pounds. During the same year 725,000 fish were brought in five cargoes from the Okhotsk sea, having been caught in Russian waters.

The cod-fishing of the north Pacific has been carried on for sixteen years, with the following results :

Year.	Vessels.	Fish.	Year.	Vessels.	Fish.
1865.....	7	469,400	1874.....	6	381,000
1866.....	18	724,000	1875.....	7	504,000
1867.....	19	943,400	1876.....	10	758,000
1868.....	10	608,000	1877.....	10	750,000
1869.....	19	1,032,000	1878.....	12	1,190,000
1870.....	21	1,205,500	1879.....	13	1,499,000
1871.....	11	772,000	1880.....	8	1,206,000
1872.....	5	300,000	Total.....		12,952,300
1873.....	7	550,000			

Of this three-fifths, or 7,771,380 fish, came from the Okhotsk sea, and the remainder, or 5,180,920, from Alaskan waters.

Salmon shipments aggregated somewhat over 3,000 barrels salted and 8,000 cases canned.

A peculiarity of the Alaska cod-fishing industry is that the fish is not cured in the vicinity of the banks. The cod is only cleaned and pickled on board of the carrying-craft, taken down to San Francisco and there pickled anew, being finally taken out and dried in quantities to suit the demands of the market. Expert fishermen located on the Shumagin islands and at Kadiak claim that the fish could be cured on the spot as well as it is done at cape Ann and other Atlantic cod-fishing stations. It is difficult to understand the reason for the process adopted by these San Francisco firms. The repeated pickling certainly does not serve to enhance the quality of the Shumagin cod-fish, and it is probably owing to this fact that the eastern cod-fish commands a higher price in the markets of the Pacific coast.

Another deep-sea fish of importance in Alaskan waters is the halibut. It exists all along the coast from British Columbia northward and westward, and also in the deep harbors and straits of the Aleutian chain of islands. Among the natives of the Alexander archipelago the halibut is a very important food-staple, being obtainable throughout the year.

The Thlinket fishermen exhibit great patience and skill in catching this huge flat-fish, which often attains a weight of several hundred pounds in these waters. It is consumed in immense quantities, both fresh and smoked, in all the villages and settlements inhabited by Thlinket tribes. Along the coast inhabited by Inuit tribes and about the Aleutian islands the halibut does not exist in the same abundance, and the whole supply is consumed fresh.

The only attempt thus far made in Alaska to preserve halibut for exportation is reported from the Klawak fishing establishment, on Prince of Wales island. It is doubtful whether anywhere in Alaska outside of the southeastern division a sufficient quantity of halibut exists to warrant fishermen in making a special business of their catch.

In order to furnish an adequate idea of the immense consumption of fish in Alaska it becomes necessary to discuss each division separately in this connection.

FIRST. SOUTHEASTERN ALASKA.—This division has a population of over 7,000 inhabitants, all of whom depend more or less upon fish for subsistence. This population consists almost entirely of natives engaged in catching and curing various kinds of fish throughout nearly the whole year; and even during the hunting season, when fur-bearing animals are in their prime and all the able-bodied male adults are busy in their pursuit, the old men, women, and youths of both sexes remain in the villages situated upon the sea-shore, fishing whenever the weather permits. Though the variety of fish is great in this region, halibut and salmon always form the basis of supply. In the Sitka market may be seen, in addition, at the various seasons several species of rock-fish, trout, cod, and herring, while mussels and clams are also abundant. The halibut is here caught exclusively with bark lines, and hooks of peculiar construction. The hook consists of two pieces of wood fastened together at one end with strips of spruce root, so as to form an acute angle with each other, an arm of the angle being furnished with a bent pointed piece of iron. The wood is generally carved to represent some animal or fish, and the bait, usually herring, is tied on so as to cover not only the hook but also the wooden shaft on which the hook is fastened. The halibut will gulp down the bait, opening its jaws wider and wider, the short arm of the hook being constructed so as to leave only a narrow space between it and the iron point, thus admitting of the motion necessary to fasten the fish while preventing its escape. A halibut thus held with its mouth wide open will soon be drowned and can be easily secured. This Indian style of halibut-hook seems to be more effective than that of civilization. Set-lines, each provided with one hook, a stone sinker, and a buoy consisting of an inflated bladder or the stomach of a seal, with a small signal or flag attached to indicate when the fish is hooked, are in common use, and are generally set in 10 or 20 fathoms of water around the numerous islands of Sitka bay.

In the open bay of Sitka salmon are caught occasionally by trolling and by spearing.

Herring are caught in immense quantities by impaling them on a sharp nail fastened to a long thin strip of wood, and are consumed both fresh and dried, but the larger portion of the catch is converted into oil. The spawn of the herring, which is collected upon spruce boughs placed in shallow water for the purpose, furnishes a

favorite article of food in a semi-putrid state. The fish most commonly seen on the drying-frames at Sitka village at all times of the year are halibut; they are cut in strips, dried partially in the open air, and then suspended in the smoke of the dwelling-houses.

At the fishing station of Klawak, on Prince of Wales island, halibut are caught with the same style of hook, and lines of kelp or bark. The principal bait used here is the cuttle-fish, the fishing being done in from 10 to 20 fathoms of water. In fishing for the cannery at this place the Indians average eight or ten halibut to a canoe per day, with two persons, using not more than three or four hooks. The amount canned here per annum has not exceeded 200 or 300 cases, of two dozen 2-pound cans each.

At Klawak, as well as at Old Sitka, salmon has been canned during the season, but the latter establishment has been abandoned. The Klawak cannery has had in its employ during the season as many as 160 Indians and 20 whites, among the former 30 being women and 5 or 6 boys. The shipments of canned salmon aggregated between 7,000 and 8,000 cases of four dozen 1-pound cans each. The once famous *rédoute* or deep-lake salmon-fishery on Baranof island, which at one time during the Russian rule supplied this whole region, and whence 2,000 barrels of salt salmon were shipped in 1868, now lies idle.

In order to arrive at the quantity of fish consumed by the people of this division it is necessary to take into consideration the fact that fully one-half or more than one-half of the catch is consumed in a dried state, very much reduced in bulk and weight. The waste in the drying process is so great that one person can easily eat at a single meal a fish that weighed 20 or 30 pounds when alive. It is therefore entirely within the bounds of probability that each individual man, woman, or child consumes the equivalent of between 3,000 and 4,000 pounds of fresh fish per year. Among the Innuits of the west the proportion must be much larger, but in the southeastern division game of various kinds is still comparatively abundant. Thus, with a population of 7,000 in round numbers, we may calculate an annual consumption of 24,000,000 pounds of fish; or, striking an average of 5 pounds per fish, between large and small, halibut, salmon, cod-fish, and herring, nearly 5,000,000 fish of all kinds, in a section the inhabitants of which consume less fish than any other coast-people in Alaska.

The eulachan (ulikon), or candle-fish, though consumed by the people of this division, is obtained chiefly in barter from the British possessions, the catch in Alaska being confined to the Stakhin mouth and its immediate vicinity.

Second. PRINCE WILLIAM SOUND.—The people of this section, numbering some 600 in all, inhabiting the coast from Mount Saint Elias westward to the east coast of the Kenai peninsula, though engaged in fishing to some extent at all times of the year, do not depend altogether upon this article of food for subsistence, and consequently the aggregate consumption, or rather destruction, of fish is less than in the southeastern division. Seal-meat at all times of the year, and the flesh of mountain goats during the summer, together with that of bears, marmots, porcupines, and sea-fowls, are consumed in perhaps equal proportions with fish. A limited number of cod-fish, halibut, herrings, and the various species of salmon comprise the catch of this region, two-thirds of which is probably eaten fresh and the remainder dried, no salt fish being prepared for home consumption or for export. An annual consumption of about 60,000 fish of all kinds (but chiefly salmon), representing an aggregate weight of 300,000 pounds, may be safely estimated for the Prince William Sound section of the coast.

Third. COOK'S INLET.—The shores of Cook's inlet are inhabited by about 800 natives and a few families of creoles, who are engaged exclusively in fishing during the whole summer season, from May to September and October. During this time the fur-bearing animals are not in good condition, and consequently the whole population, down to the small boys, turn their attention to fishing. In addition to the native fishermen, white men are engaged in salting salmon at two points in the inlet, at the mouth of the Kenai or Kaknu river and that of the Kassilof. (a) The mode of capturing the salmon adopted by the natives for their own purposes is exceedingly primitive and unsatisfactory. The fish being too large to spear with safety a frail staging of poles is erected at right angles with the river bank, extending into the stream. An Indian seats himself at the outward end of this frame, and, holding in the turbid water a large wicker basket with an aperture about 3 or 4 feet in diameter, waits patiently until a salmon enters the basket; but of course this mode of capture is impracticable where the water is clear, and even in the muddiest stream hundreds pass by where one enters.

The king salmon, or chavicha, frequent the streams of the inlet between May 20 and August 20. They are most abundant during the summer neap-tide, but in numbers their proportion to the other and less valuable salmon species is as one to three. This disparity in quantity, however, is equalized somewhat by bulk and quality. The maximum length of the chavicha reported since 1870 was 6 feet, and the maximum weight 97 pounds, the average length being about 4 feet and the average weight 50 pounds. They appear regularly on the 20th of May, running in pairs and not in schools, and hugging the shore. They at all times refuse to take the hook, and prey upon the candle-fish and stickleback, not, however, consuming very many. They are caught by the whites in weirs and nets, the latter being 12 feet deep by 120 feet in length, with about 8- and 8½-inch mesh. The weirs, consisting of poles and a wicker-work of roots and bark, are erected on the mud flats of the river at low tide.

^a Last year a cannery on the Kassilof river put up 6,000 cases of two dozen cans each.

After the king-salmon two other varieties, the silver (kisuch) and the red salmon, make their appearance in immense numbers. The mode of capturing the salmon adopted by the white fishermen is essentially the same on the Kenai and the Kassilof rivers. The number of king-salmon captured at the latter place during 1880 was 8,000, weighing 320,000 pounds, while the red and the silver salmon numbered 18,500, of an average weight of 10 pounds each, or 185,000 pounds. At Kenai the number of king-salmon secured was 7,500, weighing about 300,000 pounds.

The native population of Cook's inlet comprises 168 families (averaging about four individuals each). Each of these families prepares at least 750 pounds of dried salmon for winter provision, which would give an aggregate amount of 126,000 pounds of dried salmon put up on the inlet, representing over a million pounds of fresh fish. The creole families distributed over the various settlements number 44; these put up about 6 barrels of salt salmon each, or 264 barrels, weighing 52,800 pounds. Of dried fish these creoles put up 400 pounds to each family, or an aggregate of 17,600 pounds, representing 176,000 pounds of fresh fish. Thus we arrive at the astonishing aggregate of 2,760,000 pounds of fish as the annual consumption by natives and fishermen on Cook's inlet. It must be borne in mind, however, that by far the greater portion of this immense bulk is wasted in the process of drying.

In former times the natives of the lower part of Cook's inlet engaged largely in the capture of beluga, or white grampus, deriving from these monsters the greater part of their subsistence. The belugas seem to be plentiful in the turbid waters of the inlet, and schools of them enter some of the rivers as far as the limits of tide-water, but the practice of hunting them seems to be dying out among the present generation, which finds easier modes of procuring subsistence, and the killing of the beluga is now a rare occurrence.

Large schools of the eulachan, or candle-fish, frequent the larger rivers of the inlet and are highly prized as food, but their presence in the rivers is exceedingly brief, and the catch can scarcely be considered as an item in the domestic economy of this region.

Fourth. THE KADIAK DISTRICT.—The piscatorial wealth of this district has already been referred to in regard to cod-fishery, but at the present time the salmon catch is of greater importance both for home consumption and for export. The consumption of dried salmon within the district by 159 families of creoles and 255 families of natives amounts to 310,500 pounds, representing 3,105,000 pounds of fresh fish. The creole families put up in addition nearly 1,000 barrels of salt salmon, weighing approximately 200,000 pounds. The consumption of fresh salmon, as such, may be estimated at one-half of that of cod-fish throughout the year.

In addition to this immense catch of salmon for home consumption there are on the Karluk river, emptying into Shelikhof strait, on the west coast of Kadiak island, two fishing establishments of considerable magnitude; between 1,600 and 1,800 barrels of salted salmon being secured here by the two firms during the season of 1880. (a) Several hundred of these barrels were filled with bellies only, a process that required the killing of 37,500 fish in order to fill 125 barrels. Three hundred thousand pounds of salmon were converted into "yukala" at this station in 1880, yielding 17,500 pounds of dried fish, and it is safe to presume that at the present time three or four times this quantity is salted at Karluk and shipped to San Francisco. The run of salmon in the Karluk river at the height of the season is so great as to interfere seriously with the movement of canoes in crossing the stream, and from 10,000 to 20,000 barrels could be filled here easily during the season. The fishing is done entirely with seines from 20 to 25 fathoms in length, 3 fathoms in depth, with a mesh of 3½ inches. The average weight of the salmon secured at Karluk is 10 pounds. The whole native population is employed in these fisheries during the summer, turning their attention to hunting only during the winter.

Among the creoles of the Kadiak district and the more prosperous of the native families the use of the bidarka or kaiak has been to a great extent superseded by small craft—sloops and plungers, mostly built to order by the skillful carpenters of the creole settlements of Afognak and Yelovoi. A few fishing-schooners ranging from 15 to 20 tons burden have also been constructed at Kadiak and Wood island, but these are employed in fishing comparatively a small portion of the time, being chartered by traders during the hunting season.

The salmon of Karluk is perhaps a little inferior in quality to that of Cook's inlet, but, being possessed of flesh of a deep red color, it meets with ready sale.

Fifth. THE BELKOVSKY DISTRICT.—This district includes the Shumagin islands, which have already been discussed in connection with the cod-fishery. Throughout this section salmon is caught only for home consumption, for which purpose there seems to be an abundant supply; but with cod-fish near at hand in the immediate vicinity of every settlement it is not looked upon as being of great importance. The inhabitants of this district are nearly all successful sea-otter hunters, who are able to purchase large quantities of imported provisions, and consequently the consumption of fish is much less than in some other districts. A calculation could not be made upon the same basis here as in the Kadiak or Kenai districts, but the 167 families inhabiting the settlements of Belkovsky parish consume perhaps from 150,000 to 200,000 pounds of salmon annually, fresh and dried, and an equal quantity of cod-fish.

Sixth. THE OONALASHKA OR ALEUTIAN DISTRICT.—The inhabitants of Oonalashka district engage chiefly in the pursuit of the sea-otter, and fishing is limited by the demand for home consumption. The fishes here are nearly the same as those of the Kadiak and the Belkovsky districts, with the exception of the green-fish or

a Last year one firm shipped from the same place 5,000 cases of canned salmon and 2,100 barrels of 200 pounds each of salt salmon.

rock-cod, which is plentiful in the deep bays of the Aleutian chain of islands; flat-fishes, halibuts, and flounders are very abundant, and are taken in large quantities with spears; the halibut, however, is not as large as that found in other districts of Alaska. As has already been remarked, cod-fish also frequent the harbors and a few banks in Bering sea, and the striped fish, yellow fish, or Atkha mackerel exists here in immense numbers. This fish (described by Pallas as *Labrax monopterygius*, but known at present as *Pleurogrammus monopterygius*) is found about the whole of the Aleutian chain, and also among the Shumagin islands, congregating in large schools. At Attoo it is known as the kelp-fish, on the Shumagins as the yellow or striped fish, and from Onalashka to Atkha as the Atkha mackerel. The last name appears very appropriate, from the fact that when salted and preserved just as mackerel are treated, it has the same taste as the latter. There can be no doubt that if this striped fish were properly introduced into the markets it would meet with a ready sale, as it is certainly an excellent food-fish either salted or fresh. Traders at Nazan bay, Atkha island, report that 500 to 600 barrels could easily be put up by them in that bay alone. The latest price of this salt fish reported from San Francisco was only \$10 a barrel, but it is safe to presume that the same fish put up in a marketable shape in kits would command a better price.

Three or four species of trout and many varieties of salmon frequent the bays and larger streams of this district, existing everywhere in sufficient quantity to supply the inhabitants with winter stores of dried fish or yukala. Captain's harbor, on Onalashka island, is frequented at certain seasons by immense schools of herrings of a large variety, and exceedingly fat. Occasional shipments in small lots to San Francisco meet with ready sale in that market, especially for pickling.

Here, as in the Belkovsky district, the comparative wealth resulting from the sea-otter trade has caused the natives to neglect their natural food-supplies, such as fish and game, and to purchase imported provisions; consequently the consumption of fish is proportionately much smaller than in less favored districts; but at a rough estimate the annual destruction of fresh fish by the inhabitants of the Onalashka or Aleutian district, numbering some 1,400, may be put down at 700,000 pounds.

Seventh. THE BRISTOL BAY DISTRICT.—This district comprises the coast of Bering sea, between Krenitzin strait and cape Newenham, with the rivers Oogashik, Igagik, Naknek, Kvichak, Nushegak, Igushek, and Togiak, and their tributaries. The natives of this region, numbering about 4,000, derive a very large proportion of their subsistence from the various kinds of salmon, which frequent the rivers in the greatest abundance. Exports from this section have thus far been limited to from 800 to 1,200 barrels of salted salmon per annum from the Nushegak river.

The inhabitants of a few settlements on the north coast of the Alaska peninsula and about Bristol bay engage occasionally in the pursuit of the whale and walrus, gaining thereby a very considerable addition to their food-supply, but the consumption of salmon is not thereby perceptibly lessened.

The annual "run" of the salmon family in the rivers of this district begins in the last half of May and continues until the beginning of September. The inferior species of red-fish and "gorbusha" are caught until late in October, and even in November, while the various kinds of salmon-trout and white-fish exist under the ice of streams and lakes throughout the winter. By the middle of September the banks of lakes and rivers, whose waters begin to fall with the first frosts in the mountains, are covered with rows and heaps of dead silver and king salmon two and three feet in height, representing the number of these fish that died from exhaustion and bruises received in struggling with the fierce current, the rocks, and snags in their annual journey of reproduction. The description of one river at this period may serve as a type for all. In the month of September, 1880, I struck the Igushek river where it springs from a beautiful lake surrounded by mountains of considerable height. The gravelly beach of the lakes and every bar and shoal of the river was lined with the decayed and putrefying bodies of the fish, which lay in windrows, as it were, from one to two feet deep; while every overhanging bough and projecting rock was festooned with the rotten bodies. At night a space had to be cleared of this disgusting mass to pitch our tent upon, and the abominable stench affected us to such a degree that, though entirely without provisions, we did not feel the pangs of hunger there.

There can be no doubt that here, as well as in the districts already discussed, a more economical method of preserving the fish would permit of the exportation of large quantities, though the salmon caught annually to feed these 4,000 people cannot be estimated at less than 2,000,000 pounds.

Eighth. THE KUSKOKVIM DISTRICT.—We now turn our attention to another district drained by a great river, and somewhat densely inhabited by an almost purely ichthyophagous population. Salmon in three or four varieties throng the channel and sloughs of the Kuskokvim from May to October; trout and white-fish of various kinds are trapped under the ice throughout the winter, while the backwaters of the tundra, the lakes, and ponds are full of pike and a very toothsome and nutritious small black-fish peculiar to this region and the Yukon delta, which has been named, in honor of Mr. William H. Dall, *Dallia pectoralis*. The fish is so abundant that only old men, boys, and women engage in the catch, while the men hunt reindeer and moose, and pursue the "maklak" (a large seal) for the sake of its luscious blubber. In the estuary of the Kuskokvim and the wide-mouthed tide-creeks of the low delta land the beluga, or white grampus, is still quite plentiful, and furnishes ample stores of blubber and oil, a large proportion of which finds its way to the people living above tide-water, who can only obtain by purchase the oil in which to dip their dried salmon.

The consumption of salmon in this district, thickly populated as it is within a hundred miles of the coast, is exceedingly great, for here not only human beings but dogs also must be fed. The ratio accepted for the other districts of 500 pounds of dried fish for each individual must be increased here by at least one-fifth, representing 6,000 pounds of fresh fish destroyed for the maintenance of one individual and his proportionate share of the family dogs.

Throughout the winter, when snow lies deep through forest and tundra, and hunting is made impossible, the native of the valley of the Kuskokvim depends entirely upon the supply of white-fish (*Coregonus*) in the main river and its tributaries, and every village has its traps set over eddies and shoals as soon as the ice is firmly established. The traps are of nearly the same construction as those used in the summer, but of somewhat smaller dimensions, as they are not intended for the reception of the huge king salmon or the full-grown "nalima". Every morning at dawn, or between 8 or 9 o'clock, the men of the village can be seen making their way to the traps armed with ice-picks, curiously fashioned from walrus-tusks or reindeer-antlers, for each succeeding night a new, solid ice-covering forms over the trap, which must be removed to get at the fish. Sometimes after an extraordinarily cold night it happens that the whole wicker-basket of the trap, including its contents, is frozen solid, an accident involving considerable labor, as the trap must then be taken to pieces and built anew. In spite of all such difficulties the supply of white-fish is generally sufficient for the maintenance of the Kuskokvim people during the winter, with the help of the scanty stores of dried salmon preserved during the summer and the hares and ptarmigans trapped by the boys.

In the lakes, the feeders of all the tributaries of the Kuskokvim, the salmon-trout is quite plentiful throughout the winter, and is secured by the natives with hooks and lines or dip-nets through openings in the ice. Were it not for this unfailing supply of white-fish and trout it would be impossible for these improvident savages to live through the winter. This remark refers only to the inhabitants of the upper river. On the lower river, within the influence of the tremendous tidal action described elsewhere, the river does not sustain a solid covering of ice, and seals are hunted throughout the winter, furnishing ample supplies of luscious oil and blubber; and even the beluga comes up the gulf-like estuary in schools, puffing and snorting like a fleet of tug-boats between the masses of ice floating up and down with the changing tide.

The oil obtained from the beluga and the large seal (maklak) is a very important article of trade between the lowland people and those of the mountains, the latter depending upon it entirely for lighting their semi-subterranean dwellings during the winter and to supplement their scanty stores of food. The oil is manufactured by a very simple process. Huge drift-logs are fashioned into troughs, much in the same manner as the Thlinket tribes make their wooden canoes. Into these troughs filled with water the blubber is thrown in lumps of from two to five pounds in weight; then a large number of smooth cobble-stones are thrown into a fire until they are thoroughly heated, when they are picked up with sticks fashioned for the purpose and deposited in the water, which boils up at once. After a few minutes these stones must be removed and replaced by fresh ones, this laborious process being continued until the oil has been boiled out of the blubber and floats on the surface, when it is removed with flat pieces of bone or roughly-fashioned ladles and decanted into bladders or whole seal-skins.

The densely-populated delta between the mouths of the Kuskokvim and Yukon rivers, with its great network of channels, sloughs, rivers, and lakes, offers to its inhabitants scarcely any article of food but such as is drawn from the water, the beluga and the seal furnishing the meat and oil so necessary to sustain life in high latitudes, while the salmon and white-fish abound here as they do on the larger rivers; and in addition to these is found the small black-fish named *Dallia pectoralis*. This fish, not exceeding five or six inches in length, and scarcely known to the scientific world until a few years ago, is of the greatest importance for the inhabitants of this delta. It is found in all the shallower channels and lagoons throughout the country in such quantities as to furnish subsistence for whole settlements in the most desolate regions, where nothing else could be found to sustain life at certain seasons of the year. The black-fish, as it is called by the natives, is exceedingly fat, and a good quality of pellucid oil is obtained from it by the process described above. Its presence is of the greatest advantage to the civilized traveler who may happen to traverse this almost unknown region, as it represents the only palatable article of food to be found there during the winter; and without it he would be obliged to subsist upon dried fish, blubber, and oil in various stages of decomposition. The people inhabiting the region where the black-fish is found are in a better condition physically when spring approaches than any of their neighbors in regions where it does not exist, being almost exempt from the annual period of starvation elsewhere preceding the beginning of the salmon run in the rivers. The 3,000 or 4,000 people inhabiting the delta must be looked upon as fish-eaters only, and the consumption of fish by them in the course of the year must be correspondingly great.

Ninth. THE YUKON RIVER DISTRICT.—It is next to impossible to form an adequate estimate of the consumption of fish on a river of the magnitude of the Yukon from the point where it enters Alaska on the British Columbian boundary until it reaches Bering sea. We know that the run of the various species of salmon is very large, though not extended over a long period, and also that a large proportion of the catch is preserved by the wasteful process of drying only, which reduces a fish weighing as it comes out of the water from 60 to 100 pounds to a flat and shriveled object of from 5 to 10 pounds. The loss on all classes of fish is in a like proportion, and consequently the quantity required for the sustenance of a single individual throughout the seven or eight months of winter must be very great.

As far as the Eskimo race has extended its settlements on the banks of the river, to a distance of from 200 to 300 miles from the sea, the fish-traps already described lie on both banks; but as this mode of fishing affects only such fish as ascend the stream along the banks and eddies, the number of salmon which complete their journey of reproduction without meeting any obstacles must exceed by far the number secured by the natives. In view of the immense width and depth of the river it seems very doubtful whether any of this immense mass of fish could be secured by fishermen, even were they provided with all the appliances now in use on the Columbia river in Oregon and the Sacramento in California.

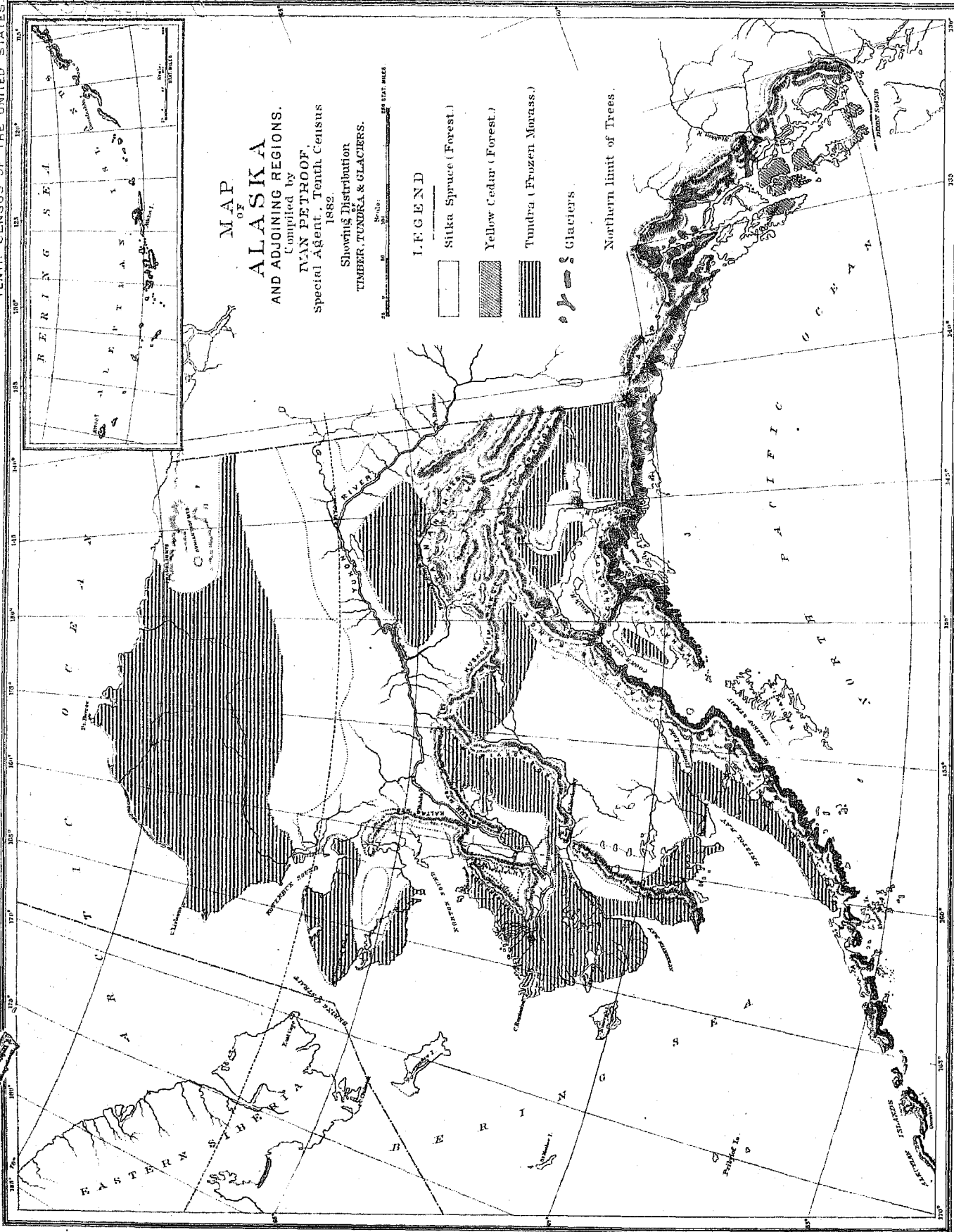
The Athabaskan tribes inhabiting the upper Yukon region do not, as a rule, make use of traps. The game is still plentiful in their country, and they resort to fishing only with hooks and lines, chiefly in the smaller streams and lakes. For the purpose of securing a small stock of fish for traveling-stores and dog-feed, whole families descend the river in the summer and camp at some favorable spot for a month or two, while others obtain the same supplies in exchange for furs from the natives of the lower river. In addition to man and his dogs we find here another factor in the consumption of fish in the bear (*Ursus Richardsonii*), who is an expert fisher, and consumes immense quantities both of salmon and white-fish. He is accustomed to select a projecting point on the sloping bank of a river, where he stretches himself close to the water's edge and watches the surface of the turbid stream. The ripple caused by the passage of a large fish informs him of the proper time to make a sweep with his huge paw, the claws projecting like so many hooks, and he seldom fails to bring forth one or more fish at a time. These he carries away to some distance from the river bank, where he lies down and strips the bones of all the flesh as neatly as if he intended to preserve the complete skeleton as a specimen. The bones of salmon and white-fish are frequently found at a distance of a mile or two from the streams, where the fish have been carried by bears to feed their young. These animals are plentiful throughout the Yukon region, and subsist upon no other food from the time the salmon begins to run until the berries are ripe, late in August, when the shaggy fish-eaters become strict vegetarians.

For the Yukon River district the annual destruction of fish for the maintenance of each individual cannot be calculated at less than 6,000 pounds.

Tenth. THE ARCTIC DISTRICT.—Of the consumption of fish along the Arctic coast of Alaska to the northward of Bering strait no reliable data are accessible. The people subsist to a greater extent upon seals, walrus, and the meat of whales. The run of salmon in the few larger rivers watering this region is necessarily short, and the fish is much smaller than we find it to the southward; the natives, however, manage to put up during the brief summer a small supply of dried salmon and white-fish. "Fakhnia," a species of tom-cod, is caught during the summer along the lower Arctic coast, and salmon-trout ascends the larger streams. Cod-fish have been caught at a few points along the Arctic coast, but no banks have been located. Of late years, since whaling has been pursued more actively by means of steam-vessels and improved appliances, the Eskimo living upon the coast have lived so largely upon the offal left to them by whalers after cutting up the huge cetaceans that they have been enabled to neglect fishing to a great extent; but unfortunately these same whalers, who temporarily increased one source of subsistence, destroyed by thousands an animal furnishing the staple food of these regions—the walrus—which is rapidly being exterminated for the sake of its ivory. The animals are shot with rifles from ships and boats, and out of ten animals killed but two or three are secured, while seven or eight sink and are lost. This wasteful practice is a question of life or death with the poor Eskimo. At points most exposed to such depredations, like Saint Lawrence island, in Bering sea, two-thirds of the people have already perished by starvation. The evil is increased by the effects of spirituous liquors freely distributed among these natives by whalers and illicit traders, causing the latter to neglect, during periods of wild intoxication, the laying up of stores for winter.

The whaling industry of the north Pacific is now carried on chiefly on the American side of the Arctic, beyond Bering strait, with the exception of some coast-whaling on the California coast and in the channels and passages of Alexander archipelago. The vessels engaged in the business on the Alaskan coast in 1880 were thirty-six sailing-craft and four steamers. Their catch consisted of 35,000 pounds of whalebone, 15,000 pounds of ivory, and 21,000 barrels of oil. The value of the bone alone was \$850,000; that of the oil 280,000; while the ivory brought \$9,000, making a total of \$1,139,000, or an average of \$28,475 per vessel—certainly a remarkable showing of the profits accruing from this industry. The 15,000 pounds of ivory represent at least 3,000 walruses, the average weight of a pair of tusks being 5 pounds. The 3,000 walruses whose tusks were secured would indicate that at least 10,000 were killed, seven-tenths of which were lost. In view of such wanton destruction it is easy to foresee the extermination, at no distant date, of the people who depend upon the walrus for subsistence.

The common hair-seal and the sea-lion have decreased in numbers to such an extent along the whole coast-line of Alaska that their pursuit no longer occupies a place among the industries of the country, and they supply a wholly local demand. The sea-lion has almost disappeared from the vicinity of the sea-otter hunting-grounds, compelling the trading firms to import such skins from the coast of lower California and Mexico, in order to furnish their hunters with the material for making their canoes. Sea-lion meat was once a staple article of food with the Aleutian people and among all the Eskimo tribes, but at present it is looked upon as a delicacy not easily obtained.



The supply of fish of various kinds in Alaska is practically inexhaustible, but the stores lavished upon the natives of that country by bountiful nature could not be more wastefully used than they are now. Any development in the fishing industry must necessarily be an improvement, causing a saving in the supply.

The proportion of Alaskan fish brought into the markets of the civilized world, when compared with the consumption of the same articles by the natives, is so very small that it barely deserves the name of an industry of the country. The business, however, shows a decided tendency to increase in magnitude, and within the last few years the shipments of salted salmon in barrels from the Kadiak-Alutian divisions have been steadily increasing, until they now amount to between 4,000 and 5,000 barrels per annum. These sell readily at \$9 per barrel in San Francisco, leaving a handsome profit to the men who have invested capital in the enterprise. The number of cases of canned salmon shipped during the last year was between 8,000 and 9,000, each case containing two dozen 2-pound cans. Cod-fish shipments from the Shumagin islands and Bering sea amount to nearly 600,000 fish of the average weight, when cured, of from 3 to 5 pounds each, bringing from 6 to 7 cents per pound. But few men with a small amount of capital are engaged in this industry in Alaska in the present unsettled condition of the country.

THE TIMBER OF ALASKA.

The claims of Alaska to the possession of vast tracts of valuable timber have been both exaggerated and disputed.

At the beginning of this chapter we sketched the distribution of forests throughout the whole country. In detail we find that the timber of Alaska consists of evergreen trees principally, the spruce family preponderating to an overwhelming extent. These trees grow to their greatest size in the Sitka or Alexander archipelago. An interval occurs from Cross sound until we pass over the fair-weather ground at the foot of Mount Saint Elias, upon the region of Prince William sound and Cook's inlet, where this timber again occurs, and attains very respectable proportions in many sections of the district, notably at Wood island and portions of Afognak, and at the head of the Kenai peninsula and the two gulfs that environ it. The abundance of this timber and the extensive area clothed by it are readily appreciated by looking at the map, and are rendered still more impressive when we call attention to the fact that the timber extends in good size as far north as the Yukon valley, clothing all the hills within that extensive region and to the north of Cook's inlet and Kenai peninsula, so that the amount of timber found herein is great in the aggregate. The size of this spruce timber at its base will be typified in trees on Prince of Wales island 50 feet and over in height, with a diameter of at least 3 feet. They have not grown as fast as they would have grown in a more congenial latitude to the south, such as Puget sound or Oregon; hence when they are run through the saw-mill the frequent and close proximity of knots mar the quality and depress the sale of the lumber. Spruce boards are not adapted to nice finishing-work in building or in cabinet ware, or, indeed, in anything that requires a finish and upon which paint and varnish may be permanently applied, for under the influence of slight degrees of heat it sweats, exuding minute globules of gum or rosin, which are sticky and difficult to remove.

The other timber trees in southeastern Alaska, Kadiak, and Cook's inlet may be called exceptional. But one very valuable species of yellow cedar (*C. nutkanensis*) is found scattered here and there within the Alexander archipelago and on the 30-mile strip. Here this really valuable tree is found at wide intervals in small clumps, principally along shoal water-courses and flords, attaining a much greater size than the spruce, as frequently trees are found 100 feet high, with a diameter of 5 and 6 feet. The lumber made from these is exceedingly valuable, of the very finest texture, odor, and endurance, and is highly prized by the cabinet-maker and the ship-builder.

While, therefore, we find a very large supply of timber in Alaska, such as we have described, yet it is instantly apparent that as long as the immense forests of Oregon, Washington territory, and southern British Columbia stand as they exist to-day there will be practically no market for Alaskan lumber.

The accompanying map indicates, as far as it has been ascertained, the distribution of the yellow cedar (*C. nutkanensis*) and the Sitka spruce (*Abies sitchensis*), and also the northern and western limits of the latter tree. The white birch is found throughout the region which supports the spruce—scattered or in small bodies—chiefly along the water-courses. The alder and willow are found on all the low lands, reaching far beyond the northern and western limit of the spruce. A poplar, resembling our cottonwood, attaining great size under favorable circumstances, is also found in nearly all the timbered sections of Alaska south of the Arctic circle.

To the westward of the one hundred and forty-first meridian no timber grows at an altitude higher than 1,000 feet above the level of the sea, and consequently the forests are confined entirely to valleys and plains, all mountains being bare throughout the section indicated. On Kadiak island and on the Aliaska peninsula the change from a vigorous growth of spruce timber to bare hills and grassy plains is very abrupt, and is apparently unexplained by any corresponding change in soil, temperature, or general climatic conditions. A slightly-curved line, beginning at the intersection of the coast-hills of the east shore of Norton sound with the Oonalakleet river, passing across the Yukon and the Kuskokvim rivers, the mouth of the Nushegak, across the Aliaska peninsula, and impinging upon the north Pacific in the vicinity of Orlova bay, on Kadiak island, will serve as the western limit of spruce forest in Alaska.

With reference to quality the Alaska forest trees may be divided as follows:

1. **YELLOW CEDAR** (*Cupressus nutzkanensis*).—This is one of the most valuable woods on the Pacific coast, combining a fine, close texture with great hardness, durability, and a peculiar but pleasant odor. The Russians named it "dushnik" (scented wood) on account of the last-named quality. In the immediate vicinity of Sitka, on Baranof and adjoining islands, this tree was nearly exterminated by the Russians, but on the Kehk archipelago (Koo island) and on Prince of Wales island and a few others of the Alexander archipelago, near the British Columbian frontier, considerable bodies of it can still be found, and beyond the line, in the Nass and Skeena River valleys, it is also abundant.

2. **SITKA SPRUCE** (*Abies sitkensis*).—This is the universal forest tree of Alaska, and is found of gigantic size on the islands of the Alexander archipelago and on the shores of Prince William sound. Its medium growth it appears to attain in the valleys of the Yukon and the Kuskokvim, while on the east side of Cook's inlet and on the more northern uplands it is quite stunted and dwarfed. The Sitka spruce is most closely connected with the various requirements of all Alaskan natives in their domestic economy, as its timber is used in the construction of nearly every dwelling throughout the country, and even those tribes who inhabit barren coasts far removed from the limits of coniferous trees are supplied with it through means of freshets and ocean currents. The sappy outer portion of the wood furnishes splinters and torches that light up during long months of winter the dark dwellings of interior tribes of Tinneh stock, who know not the oil-lamp of their Innuut neighbors. The same material is also used for sledge-runners on loose but crisp-frozen snow, over which iron or steel would drag with difficulty, as over deep, coarse sand. The Thlinket and the Hyda fashion their buoyant and graceful canoes, both large and small, from spruce logs, and split from them also the huge planks used in the construction of their houses. The lumber manufactured from the Sitka spruce is much less durable than the yellow cedar, very knotty, and consequently not adapted for ship-building.

3. **HEMLOCK** (*Abies mertensiana*).—Though this tree generally exceeds the spruce in size, it is of rare occurrence, much less valuable as timber, but well adapted for fuel.

4. **BALSAM FIR** (*Abies canadensis*).—This tree is found only in small, scattered bodies, and is of little value as timber, but the natives use its bark for tanning and for other purposes.

5. **SCRUB PINE** (*Pinus contorta*).—The scrub pine is found throughout the interior of Alaska in small, scattered bodies up to the highest latitudes, but it is of no value as timber.

Thus it will be seen that the forests of Alaska are altogether coniferous, as the small bodies of birch and the alder and willow thickets on the lower Yukon and Kuskokvim rivers can scarcely be considered to come under this head. Aside from the yellow cedar, which is rare, the timber wealth of Alaska consists of the Sitka spruce, which is not only abundant and large (trees of from three to four feet in diameter being quite common in southeastern Alaska and Prince William sound), but also generally accessible.

To give even an approximate estimate of the area of timbered lands in Alaska is at present impossible, in view of our incomplete knowledge of the extent of mountain ranges, which, though falling within the timber limits, must be deducted from the superficial area of forest-covering.

A few small saw-mills of exceedingly limited capacity have been erected at various points in southeastern Alaska, to supply the local demand of trading-posts and mining-camps, but finished building lumber is still largely imported even into this heavily-timbered region. In all western Alaska but one small saw-mill is known to exist, which is on Wood island, Saint Paul harbor, Kadiak. This mill was first set up to supply saw-dust for packing ice, but since the collapse of that industry its operations have been spasmodic and not worth mentioning. Lumber from Puget sound and British Columbian mills is shipped to nearly all ports in western Alaska for the use of whites and half-breeds, while the natives in their more remote settlements obtain planks and boards by the very laborious process of splitting logs with iron or ivory wedges. On the treeless isles of the Shumagin and Aleutian groups, as well as in the southern settlements of the Aliaska peninsula, even fire-wood is imported from more favored sections of the territory and commands high prices.

The drift-wood washed upon the shores of Bering sea and the Arctic is of very little value as building material and cannot be worked into lumber.

On the map I have also endeavored to show approximately the extent of the tundra, or marshy plains, producing a vigorous growth of mosses, grasses, and even flowers, but resting upon a substratum of frozen soil and ice which does not thaw during the brief summers. The glaciers also have been indicated where they are definitely known to exist, but others could doubtless be found in mountain regions not yet visited.

MINERALS.

Coal is found, chiefly or wholly of a lignite composition, at a great many points throughout the southern and western coasts of Alaska and the islands thereof; and during the past season a vein was opened in the Arctic, above cape Lisburne, by Captain Hooper, of the revenue marine, who says that he mined it easily and used it with great satisfaction in making steam for his vessel. The oldest coal-mine in the country is that on Cook's inlet, near its mouth, at a place still called on the map Coal harbor. The Russians also took notice of coal at Ounga, on the

Shumagin islands, and several openings were made by them of veins here and there in the Alexander archipelago. Following the Russians our people discovered and attempted to work one or two in the Sitkan archipelago and several to the westward. The quality of all this coal located and worked for a brief experimental period was of so poor a grade that in no case has it been pronounced fit for use on steam-going vessels, being so highly charged with sulphur and other deleterious combinations. The value, however, of Captain Hooper's vein in the Arctic to the opening enterprise of steam-whaling, and for the use of the revenue marine itself, must be of very striking moment. These experiments with Alaskan coal have been exceedingly thorough and patiently wrought out at Ounga, where the most laudable, persistent, and even desperate determination has been manifested by the owners of certain ledges thereon to develop their holdings into mines of wealth. The steamers in the territory bring their own coal with them, or have it sent up by tender from British Columbia sound or California. The traders at the different posts where timber is scarce or entirely wanting use it now as their principal fuel, and it is the sole fuel on the seal islands.

In regard to the reputed findings of large-paying gold-mines and other precious minerals I can only say that, as far as is known, there is nothing of the kind in western Alaska; at least there is nothing located and worked as such, though the prospecting or searching is as active as it has been since the transfer. The surface of the country in southern Alaska being so mountainous and concealed by the timber-cloak everywhere covering it, it is of course a slow and exceedingly difficult undertaking to penetrate any distance back, up, and among the mountain valleys in search of mineral. The color of gold can be washed out of the sands of every little stream emptying into the ocean on the northwest coast, and in many places it can be found by searching in the surf-beaten beaches of the sea-coast itself. But the question immediately arises with the miner, "Will it pay?" and by that he means "Will it yield me from \$4 to \$10 a day if I work it?" Less return for his labor does not satisfy him, nor will it bring others to the places.

The gold-bearing belt of the Rocky Mountain divide, so familiar to us as it crops out all through our states and territories, reaches undoubtedly to the Arctic sea itself. But it must be borne in mind that with every degree of northern latitude as we ascend we cut off working-days, as the icy grasp of frost checks the flow of water and shuts down the mills, so that when this gold-bearing belt crosses into our Alaskan boundary far back, and concealed from the sea by the towering summits of the coast range, we find it practically barred out from our miners unless they shall find the free gold and a rich quartz in unwonted abundance.

The quartz-mines in the immediate vicinity of Sitka have been abandoned as worthless under present conditions, the output officially reported for the year ending June 30, 1880, being but a trifle over \$6,000, with an expenditure of nearly four times that sum. Since 1880, however, much surface-gold has been found in the mountains on Gastineaux channel, between Douglas island and the mainland, chiefly from the decomposed croppings of ledges. These discoveries have attracted several thousand miners and their followers, and a thriving town, now named Juneau City, has sprung up, claiming very bright prospects in spite of the long interval of enforced idleness between December and April. The never-satisfied prospector has already left these diggings behind and pushed on from the head of Lynn canal across the divide separating the headwaters of the Yukon from the north Pacific; but whatever discoveries have been made there are located in British Columbia, and consequently without the pale of this report.

The Cassiar diggings, which have during the last five or six years given quite an impetus to Alaskan travel by fort Wrangell and Sitka, are situated in the territory or dominion of British Columbia, far up the Stakhin river, and away from our limits. They have been failing lately, and the last season's work has been one of sore disappointment and discouragement to the few miners who still hold on.

In Norton sound, within the deep land-locked shoals of Golovin bay, there are reputed to be leads of silver ore and graphite. Cinnabar has also been discovered on the Kuskokvim, and assays made of the ore in San Francisco indicate a very valuable discovery there. Other than these minute circumstances we have no better evidence of the mineral wealth of Alaska to offer at this writing, unless we refer to the old legend and partial corroboration of it in regard to the presence of an extensive deposit of copper *in situ* on the banks of the Atnah or Copper river. There is also a mine opened, but just at present not worked, on Prince of Wales island. This little mine, however, we might say is owned by British Columbians, who say that they are barred out from their legitimate home market on account of the Dominion tariff; hence they are idle.

In connection with the discussion of the mineral resources of Alaska I insert here a translation of the report rendered by Lieutenant Doroshin, who was intrusted by the Russian-American Company with an examination of the gold-bearing deposits on the Kenai peninsula. Doroshin has frequently been accused of suppressing the results of his explorations in order to please the Russian-American Company, but from his report and private letters on the same subject it would seem that such was not the case. He wrote as follows:

In the year 1850 I was ordered to the gulf of Kenai (Cook's inlet) in order to investigate the indications of gold first discovered by me in 1848, during my first visit to that neighborhood. I left Sitka on the 1st of May and returned on the 4th of October. During this period the laborers under my command were at work only forty-nine days, the remainder of the time being spent in excursions to Nuchek, and Ochek islands, and Voskressensky bay, and also in the laborious ascent of the river Ka-ktnu, and the tedious transportation of provisions and implements on the backs of men.

In 1851 I left Sitka on the 8th of May and returned on the 30th of October, calling at Nuchek and Saint Paul harbor (Kadiak island). The working-days during this summer numbered sixty-six, much time being wasted in the transportation of provisions and tools. The working force during this season was the same as the last—twelve men.

Under these circumstances my prospecting was confined to (1) the valley of the creek Tuslitnu, emptying into the lake Kastudilin, the head of the river Ka-ktuu; (2) the valley of the creek Taslikh-tuu, with its tributary ravines, and (3) the valley of the creek Chunu-ktuu, with several lateral ravines. The streams Taslikh-ktuu and Chunu-ktuu empty into the Skiliankh river, connecting the lakes Skiliamna and Kastudilin.

Nearly everywhere in these localities gold was found, but nowhere in a larger quantity than $\frac{1}{100000}$ of the dirt, or 16 grains of gold to 1 pood (36 pounds) of dirt.

Though the results of my two years' exploration of the Kenai mountains were thus insignificant, they may be the foundation for more extensive search of the gold-bearing strata. Aside from the valley of the Tuslitnu, where I could not complete my investigations on account of a forest fire, only two other valleys, with their tributary ravines, were examined, and consequently only a small surface of the mountainous Kenai peninsula has been touched, while nothing has been done in the main mountain ranges of which the Kenai chain is only a branch.

In the following year (1852) Doroshin wrote to Professor G. A. Gosse:

The small result of my labors has cooled the ardor of the chief manager of the colonies for gold-seeking. I do not cease to hope, however, that later some other engineer will be more fortunate in the path pointed out by me, with better means than were at my disposal; in that case, of course, nobody will think of him who first found gold where there were no ancient diggings—where no grains of gold were found in the crop of a grouse [referring to an incident of gold-discovery in Siberia], and where the natives have not even a name for the precious metal.

In November, 1855, Doroshin wrote to General Helmerson, member of the Imperial Academy:

Last summer I have passed among the mountains of the Kenai peninsula, where I had discovered traces of gold as early as 1848. In that year I became convinced that the alluvial sands of the site of the R doute Saint Nicholas are auriferous. When we find gold in such localities there must be deposits of auriferous ores or sands somewhere. This reasoning and the peculiar combination of clay and diorite on the upper Ka-ktuu induced me to explore its headwaters. We found gold at the outset, and as we advanced up the valley it became evident that coarser particles of gold took the place of the at first barely visible scales.

AGRICULTURE.

I now pass to the agricultural and pastoral resources of Alaska. So much has been said upon this topic, of frantic declamation on one hand and indignant remonstrance on the other, that I shall be very cautious in my presentation of what I know to be facts.

In the first place, let me preface my remarks with the statement that the cereal crops cannot be grown in Alaska; this has been settled by numberless patient and repeated tests in the most favored localities. Also, that the fruit trees and the small fruits of our gardens here, as we grow them and recognize them (unless it be the strawberry and the cranberry), cannot be cultivated successfully up there. But these people do have in Alaska quite an abundance of indigenous, hardy shrub fruits, such as I have specified elsewhere. The statement made by certain high authority that wild apples are indigenous and perfect their fruit at Sitka is a mere figure of speech, but the other half of the assertion, that wild roses grow there, is true; and for that matter the wild rose blossoms with a rosy flush and the suggestion of perennial flowering up the Yukon, while the violets, the gaily-colored pea, and indeed nearly 200 species of lovely blossoming annuals and perennials are found everywhere on prairie and forest land, on the bare hills of the Aleutian islands, and covering the great moor and tundra of Alaska.

But taking up the subject of the vegetable garden, it is found that there are localities in Alaska where for the last eighty years or even more up to the present date good potatoes have been raised, though I should say perhaps that the raising of these tubers is not a certain success year after year except at one or two points within the Alexander archipelago, namely, at the mouth of the Stakhin river, at fort Wrangell, and on Prince of Wales island. The potato grounds of Alaska, however, can with due care and diligence be made to furnish in the Alexander archipelago, in Cook's inlet, at Kadiak island and islets contiguous, and at Bristol bay a positive source of food-supply to the inhabitants. It is not generally known that on Afognak island there are nearly 100 acres of land dug up in patches here and there which are planted by the inhabitants, and from which they gather an annual harvest of potatoes and turnips; but there are no fields spread out, squared up, and plowed anywhere in Alaska. The little openings in the forest or the cleared sides of a gently-sloping declivity in sheltered situations are taken up by the people, who turn out with rude spades of their own manufacture, principally, for the purpose of subjugating and overturning the sod. Many of the gardens, noticeably those at the Kadiak village, are close by the settlement, while others are at some distance.

The potato crop at Kadiak in 1880 was a total failure; and this happens at intervals of from four to six years. The winter preceding the planting in 1880 was an unusually cold and protracted one, and the season, short at the best, was cut off by unwonted early frosts during September and the latter part of August. The usual growing season, however, opens early in June, from the 1st to the 10th; and the potatoes are planted in May, coming up and growing freely until October, when they are harvested. This growth of potatoes, fairly established and well defined, presents the only firm and tangible evidence of agricultural capacity within the limits of Alaska. The turnip grows and flourishes wherever the potato succeeds.

On Wood island, Kadiak harbor, during a number of years past, horses have been kept to perform certain labor in connection with a mysterious ice company, and for the use of these horses a field of 12 acres of oats is regularly sown; growing up, frequently heading out, but never ripening. This, however, is a secondary object with the planters, who cut the green crop for haying purposes.

There have been repeated attempts to raise stock cattle, sheep, and hogs in large herds within the borders of Alaska. The subject is one in which the Russians first naturally took a deep interest, for they were fond of good living, and were as desirous as any people could be to have the best of beef or mutton and the sweetest pork on their tables. They brought over hardy selections from the Siberian stock, placing the cattle at almost every point of importance for trial. The result after years of patient and persistent attention was that the herds on Kadiak island threw the best and became of real service in assisting to maintain the settlement. Here there is a very fine ranging-ground for pasture, and in the summer there is the greatest abundance of nutritious grasses, but when the storms of October, freighted with snow, accompanied by cold and piercing gales, arrive and hold their own until the following May, the sleek, fat herd of September becomes very much worn and emaciated in June. It has given its owner an undue amount of trouble to shelter and feed; hay, however, suitable for cattle, or at least to keep cattle alive, can be cut in almost any quantities desired for that purpose, but the stress of weather alone, even with abundance of this feed, depresses as it were and enfeebles the vitality of the stock so that the herds on Kadiak island have never increased to anything approximating a stock-grower's drove, rarely exceeding 15 or 20 head at the most. Notable examples of small flocks of sheep which have been brought up since the transfer and turned out at Oonalashka, Ounga, and elsewhere have done well. The mutton of the Alaskan sheep when it is rolling in its own fat, as it were, is pronounced by epicures to be very fine. But the severe winters, which are not so cold as protracted, when the weather is so violent that the animals have to huddle for weeks in some dark low shelter, cause a sweating or heating of their wool, which is detached and falls off, greatly enfeebling and emaciating them by spring. The practice of the traders at some places now is to bring beef cattle up in the spring from San Francisco, turn them out into the grazing-grounds on the Aleutian islands, Kadiak, and even to the north, where they speedily round out and flesh up into the very finest beeves by the middle or end of October, when they are slaughtered. Some ludicrous instances occur in this connection when Texas cattle are disembarked in these unwonted nooks, where they charge from the gangway of the vessel up through the native settlements as though possessed of an evil spirit, while the natives dive into their barabaras with remarkable celerity and activity, peeping thence at intervals in anticipation of some fearful crisis. The animals at once repair to the solitudes of the mountain recesses of the interior, away from the settlements, where they remain undisturbed until they are hunted and shot by the traders.

The Russians familiarized some of these natives with horses as well as cattle; but a great sensation remained in store for these people after the transfer of the territory, when mules were taken up there by the soldiers under the mistaken notion that they were going to be used in going about and over the country. These animals were a source of profound astonishment to the natives, and the mules manifested toward them an exceedingly vindictive and aggressive disposition, always charging, with ears laid back, and threatened uprising of the heels, upon the luckless savages chancing to cross their feeding-grounds, the warriors turning in swift, tumultuous flight from the advance of the unknown quadrupeds when they would have faced any number of bears without moving a muscle of their countenances.

Mules and horses, however, have no economic value here, there being no service for them on land. A little work is done with profit on the seal islands by mule teams, and these, perhaps, are the only draught or saddle animals that serve any useful purpose in the territory, with the exception of those at Wood island, before mentioned.

With regard to the raising of hogs, the propensity of these creatures to devour carrion on the sea-beach bars them of much interest, and they are not encouraged anywhere. The same difficulties as specified above, however, occur in feeding and caring for them during the winter.

I feel fully warranted in saying that the extended coast islands and mainland of Alaska will not support any considerable number of our people as agriculturists, but it is also equally apparent that the existence of those who are living and who will always live in the territory can be softened in many of its asperities by better attention to the development of the resources which are latent in the soil at many favored localities, notably at Bristol bay, Kadiak, Cook's inlet, and the Sitkan archipelago. There is a singular indifference, with a growing disinclination of the people themselves to labor in this direction. In the times of the old Russian rule there were regular orders and regular squads of soldiery assigned to this purpose every year, and the old retired and patient colonial citizens were obliged by the terms of their indenture with the company to devote themselves wholly to agriculture. Now of course they are free to choose between the profits of hunting and the smaller gains of farming, and they naturally drop the latter and rally to the former. It will thus be seen that the subject of agricultural resources in Alaska is not a new agitation, and the result of American thought and industry; and it will be found that those points located by the Russians eighty years ago as most suitable for their potatoes and other garden relishes, such as radishes and turnips, are the best to-day.

BUSINESS STATISTICS.

Owing to peculiar local circumstances, and the nature of the traffic carried on in Alaska to obtain furs and fish, it is exceedingly difficult to arrive at an even approximately correct estimate of the volume of importations of provisions and dry goods. As an example of this I may cite the discrepancy existing between the sums obtained from the custom-house of San Francisco and those furnished by firms engaged in business in the country. At the San Francisco custom-house the books indicate shipments of provisions to Alaska from that port in the following quantities: Flour, 801,508 pounds, or not much over 3,000 barrels; hard bread, 3,403 cases; tea, 823 chests of 52 pounds each; sugar, 782 barrels and 2,463 half-barrels; and for the same period the books of two San Francisco firms trading in Alaska show shipments of over 5,000 barrels of flour and other provisions in proportion. At some points the consumption of imported provisions, such as flour, hard bread, tea, and sugar, is extraordinarily large, and this is especially the case in regions inhabited by the prosperous sea-otter hunters and on the Pribylof islands, where the native sealers have large incomes, and the consumption of flour amounts to a barrel per annum for each man, woman, and child, more than the average in civilized communities. It is reported by traders that the demand for flour and hard bread increases annually, even among the savage tribes of the interior. The demand for tea, also, is steadily gaining, and the consumption of sugar is universal wherever it can be carried by the traders, but is especially large in those sections of Alaska—especially in the southeastern division—where the creoles and natives understand the manufacture of alcohol from sugar and molasses. Including the southeastern division, which is supplied chiefly from Portland, Oregon, and British Columbia, the annual shipment of flour to Alaska may be estimated at not less than 10,000 barrels, or a barrel for every three individuals of its population. If to this are added 5,000 or 6,000 cases of hard bread, 1,200 chests of tea, and 2,500 barrels of sugar, it is seen that the trade with Alaska in these staples alone is assuming considerable proportions. The shipments of tobacco aggregated from 15,000 to 20,000 pounds. Of the value of the dry goods it is impossible to make an estimate, but it is safe to assume that it does not equal that of groceries or provisions.

From the above it would appear that Alaska, with its savage population of over 30,000, represents a larger volume of trade than any other portion of the United States inhabited by uncivilized tribes, even without reference to such mineral wealth as has been or may yet be developed within its limits, or to the net revenue derived by the government above all its expenditure for Alaska from the lease of the fur-seal reservation on the Pribylof islands.

The statistics relating to Alaska contained in the reports on commerce and navigation furnished by the treasury department are of a very unsatisfactory character, as a few extracts from these documents will serve to demonstrate. During the last year of Russian rule in Alaska we find the imports from Russian America to the United States for the year ending June 30, 1866, valued at \$39,544, while the exports to Russian America were \$104,315, of which \$81,609 covered domestic produce. In the year ending June 30, 1868, the first year of American occupation, the total shipments to Alaska were valued at \$56,067. This represents the period covering the first rush of business men into the newly-acquired country. During the years following this period both imports and exports apparently increased in volume, reaching the figures of \$180,000 and \$200,000 in value; but looking at the itemized list of shipments it is easily discovered that this trade is in transit from British Columbia, through the American port of Wrangell, to the Cassiar mines in British Columbia, the items showing large shipments of grain, mules, cattle, flour, hard bread, and groceries among the exports of Alaska, articles which should, of course, have been placed under the head of transit trade. All these successive reports evidently refer only to the shipments to and from Alaska through the nearest custom-houses of Port Townsend, Washington territory, and Portland, Oregon, the vast trade of San Francisco with all western Alaska not being considered at all. The statistics of immigration contained in the same treasury reports may mislead, as they simply record the transit of miners and traders through Alaska from one point in British Columbia to mining-camps in another section of that country. By far the largest portion of Alaska is removed from all communication with Sitka.

The shipping statistics derived from the same reports represent chiefly the shipping of the southeastern division. One reason for this state of affairs lies in the fact that the returns from the western ports of entry at Kadiak and Oonalashka can be forwarded to the collector at Sitka only by the sailing-vessels of fishermen and traders via San Francisco, and it often happens that these documents are delayed for months and even years.

As an instance of the deficiency of the shipping statistics I may mention that while the report of 1880 gives the number of sailing-vessels registered as seven, aggregating 133 tons, in the same year there were registered at the port of Kadiak alone eleven sailing-vessels, aggregating 175 tons in capacity.

CHAPTER III.—GEOGRAPHY AND TOPOGRAPHY.

THE MAP OF ALASKA.

The fact that the new map of Alaska published with this report differs essentially in many of its features from all the maps which have previously been published necessitates a few words explanatory of the methods adopted in compiling, of the reasons for the selection of authorities, and for changing the outlines of certain portions of the coast.

The southeastern section of Alaska, from the southern boundary to cape Spencer, comprising the islands of the Alexander archipelago, has been represented in accordance with the survey under the auspices of the British admiralty, corrected to date by Commanders Beardslee and Glass, United States navy, and assistant William H. Dall, United States coast survey. In the topography of the section of the mainland forming the water-shed between the Chilkhat and Yukon rivers, or rather between the Pacific and Bering Sea drainage systems, the late discoveries of the explorer Krause, of the Bremen Geographical Society, have been inserted, and the route to the eastern and western Kussoa lakes (the real heads of the Yukon) has been indicated.

The changes in Lynn canal, or Chilkhat inlet, and to the north of Cross sound are quite remarkable. The waters of Glacier bay extend far to the northward, where heretofore a compact peninsula appeared on the maps and charts, while the positions of Sitka and a few other important points have also been corrected.

The intricate character of the deep-sea channels which form a net-work throughout this section leads us to the conclusion that future actual and connected surveys will probably result in essential changes of outline and in the location of hundreds of islands as yet not indicated on the map.

The boundary-line between this portion of Alaska and the British possessions has been laid down as near as possible at the uniform distance of ten marine leagues from the shore-line of the mainland from the head of Portland canal to the intersection of this line with the one hundred and forty-first meridian. The clause in the Anglo-Russian treaty of 1825, which was adopted in our treaty with Russia in 1867 as defining this boundary, states that this boundary shall be a line commencing from the southernmost point of the island called Prince of Wales island, which point lies in the parallel of $54^{\circ} 40'$ north latitude, and between the one hundred and thirty-first and one hundred and thirty-third degrees of west longitude.

The said line shall ascend to the north, along the channel called Portland channel, as far as the point of the continent where it strikes the fifty-sixth degree of north latitude. From this last-mentioned point the line of demarcation shall follow the summit of the mountains situated parallel to the coast as far as the point of intersection of the one hundred and forty-first degree of west longitude, and finally from the said point of intersection the said meridian line of the one hundred and forty-first degree in its prolongation as far as the Frozen ocean; with reference to the line laid down in this article it is understood, first, that the island called Prince of Wales island shall belong to Russia [now by cession to the United States]; second, that whenever the summit of the mountains which extend in a direction parallel to the coast from the fifty-sixth degree of north latitude to the point of intersection of the one hundred and forty-first degree of west longitude shall prove to be at the distance of more than ten marine leagues from the ocean limit between the British possessions and the line of coast which is to belong to Russia, as above mentioned [to the United States by cession], shall be formed by a line parallel to the winding of the coast, and which shall never exceed the distance of ten marine leagues therefrom.

We have absolutely no data for locating the summits of the chain of mountains "running parallel with the coast"; it is not even certain that there is such a connected chain, and, consequently, it has been thought best for the purposes of this map to run the boundary in conformity with the last paragraph in the clause of the treaty mentioned, at a distance of "ten marine leagues from the sea-shore of the mainland", in expectation of a future settlement of this altogether too indefinite line by treaty or convention between the United States and the British government.

A survey with a view of locating the boundary in accordance with the obtuse wording of the treaty would be altogether too costly, but a straight line between certain easily-defined points agreed upon by mutual consent would solve a difficulty which promises to arise in the near future, owing to the discovery of valuable mineral deposits on the very ground placed in dispute or doubt by the old treaty.

It may be stated here that a line from the point above mentioned, on the fifty-sixth parallel, to the intersection of the sixty-fifth parallel with the one hundred and forty-first meridian would nearly follow the present line in southeastern Alaska, while it would give to the United States one of the head branches of the Yukon river—the main artery of trade of the continental portion of Alaska—which is now crossed by the boundary at a point considerably below the head of steam navigation.

The coast-line from cape Spencer northward to Mount Saint Elias has been drawn in accordance with the coast-survey chart of the Mount Saint Elias alpine region from observations and triangulations of assistant William H. Dall, who discovered important errors in the vicinity of Dry bay and at other points. Minute descriptions of natives, confirmed by observations of Mr. Dall, induced me to change the contour of Icy bay. From cape Yaktag to the mouth of Copper river the old outline, based upon Tebenkoff's Russian atlas, has been retained,

but the mouth of Copper river, which has heretofore been represented as a wide estuary, I found to be filled with low islands intersected by narrow, winding channels. These islands were located by magnetic bearings only. In Prince William sound the only change made consists in the relative position of the three headlands of Montague island, in accordance with my repeated personal observations. The coast-line of the sound is the same as on the coast-survey charts of this section, which are based upon the surveys of Spanish, English, and Russian explorers.

In the Kenai peninsula, the island of Kadiak, and Cook's inlet no change has been made with the exception of the location of villages or settlements in accordance with personal notes of the compiler.

The outlines of the Aliaska peninsula are essentially the same as in all earlier maps based upon the surveys of Lütke, Sarychef, and others, with the exception of a few corrections in the Shumagin group of islands, which were furnished by the United States coast and geodetic survey.

In the interior of the peninsula my observations enabled me to insert a few alterations along one of the chief portage routes from Bristol bay to Shelikof strait by way of the Naknek river and Walker lake.

The Aleutian islands are represented on this map in accordance with the charts of Sarychef and Tebenkof, with corrections to date by assistant William H. Dall and party, of the coast and geodetic survey.

The coast-line from Bristol bay to cape Newenham is essentially the same as that found on the coast-survey map of 1869, which latter is identical with that in Tebenkof's atlas.

In the interior of this section some details showing portage routes and settlements have been inserted from personal notes of the compiler.

The course of the Kuskokvim river has been retained as represented on the coast-survey map of 1869, with the exception of a portion of its headwaters corrected from Indian maps and the descriptions of traders.

The delta between the Kuskokvim and the Yukon mouths presents several striking and entirely new features, for which I am indebted to the discoveries of Mr. E. W. Nelson, United States signal service. Some years ago I was informed that the two deep indentations heretofore represented on all maps of Alaska to the north and south of cape Vancouver do not in reality exist, and happily Mr. Nelson was in a position to confirm this report, and to furnish the real outline of the coast as laid down by magnetic bearings and close estimate of distances from points known and established. That gentleman, during a sledge journey performed in the winter of 1878-'79, struck the coast of Bering sea at a point a little to the southward of cape Rumiantzof, and, taking his departure from that well-established point, followed the coast to cape Vancouver, another known point, and thence along the shore into the mouth of the Kuskokvim, finally cutting across the center of the delta to the banks of the Yukon. This journey resulted in the important discovery that cape Vancouver is located on an island formed by two wide channels uniting in a large inlet far inland. This island was named after the discoverer, while the name of Baird was bestowed upon the inlet above referred to and that of Hazen upon the bay to the north of Nelson island. (a)

Another important point confirmed by Mr. Nelson during his journey is that the central portion of this delta, where the compiler of the coast-survey map of 1869 located a chain of mountains, consists in reality of a vast system of lakes connected by shallow and intricate channels.

The course of the Yukon is laid down on this map in accordance with the survey of Captain Charles W. Raymond, United States engineers, who ascended the river to ascertain the position of fort Yukon, which he found to be considerably to the westward of its location on the maps heretofore published.

For the course of the river between fort Yukon and the British boundary I am indebted to magnetic bearings furnished by traders traveling on the steamer which ascends the Yukon to fort Reliance, an American trading-station. These bearings, confirmed by Indian maps and the descriptions of various intelligent individuals, when brought into connection with the change in the position of fort Yukon bring fort Reliance within our possessions, though heretofore it was supposed to be on British territory, owing to deductions made from the erroneous location of fort Yukon.

The course of the Tennanah river and that of the portage routes connecting this little-known stream with the Yukon on the east and the Kuskokvim on the west are represented in accordance with Indian maps and a careful comparison of statements of many traders and intelligent natives; and a change has been made in the course of the Innoko, another tributary of the Yukon, in accordance with notes of a reconnaissance made by Mr. E. W. Nelson.

The positions of Saint Michael and Stuart islands, in Norton sound have been corrected in accordance with observations of Lieutenant Hand, United States revenue marine, and Lieutenant Danenhower, United States navy, of the Jeannette expedition, who determined the same to be considerably more to the westward. A slight difference exists between the observations of these two officers, but as the naval officer seems to have had better instruments, more leisure, and more favorable atmospheric conditions, I have accepted his location of Saint Michael.

In comparing the authorities for the eastern coast of Norton sound it was discovered that the charts of the United States hydrographic office contained an important error. A draughtsman at that office in first laying down this coast-line had made use of chart No. 2 of Tebenkof's atlas, on which the meridian lines were drawn at the half degree, a mistake which remained undiscovered by the hydrographic office, and the error resulting has been perpetuated in each succeeding issue of its charts of Bering sea.

a In honor of Professor Spencer F. Baird and General William B. Hazen, under whose auspices Mr. Nelson performed his labors.

In the coast-line of northern Alaska from Norton sound to Bering strait and along the Arctic shore the charts of the British admiralty and the United States hydrographic office in their latest issues have been closely followed, with the addition of some details furnished by Captain C. L. Hooper, United States revenue marine, and E. W. Nelson, United States signal service.

In running the boundary between the Alaskan and Siberian coasts a slight variation from charts heretofore published was made necessary, in accordance with the wording of the treaty, at a point where this line passes between Saint Lawrence island and cape Chukotsk.

Wrangell island is represented in accordance with the sketch of Lieutenant Berry, United States navy, published with the latest chart of that region issued by the United States hydrographic office. The point where Captain C. L. Hooper, of the revenue marine, landed and took possession in the name of the United States was named "Hooper's cairn" on Lieutenant Berry's sketch, but the name had been omitted by the draughtsmen of the hydrographic office. As an act of justice to the first man who set foot on this Arctic island I have restored it. The latest hydrographic charts of the Arctic adopt Professor Nordenskiöld's coast-line of Siberia to East cape, but with the assistance of the observations made by Captain Hooper during the summer of 1881 I have been enabled to make important corrections between cape Serdze Kamen and cape North. Professor Nordenskiöld passed along this section of the coast late in the season with thick and unfavorable weather, while Captain Hooper was favored with the finest atmospheric conditions and double observations of both midday and midnight sun.

The contour of East cape of Siberia has been changed in accordance with a careful sketch furnished by the brothers Krause, of the Bremen Geographical Society, together with other details, the result of a boat journey along the east coast of the Chukche peninsula. This change in contour, though radical, is based solely upon the discovery that what has been heretofore represented as an island on the north side of the "neck" of East cape is really a sand-spit separating a lake containing many islands from the sea. In this connection it may be stated that many of the names of villages collected by the brothers Krause are identical with those of a list furnished by a Cossack explorer at the end of the seventeenth century.

A careful comparison of all the accessible authorities during the slow process of compilation naturally led to the discovery of errors in many of the maps and charts consulted, but throughout this work it has been the experience of the compiler that the Russian atlas of Tebenkof, and to a certain extent the charts of Sarychef, furnish the most reliable material—in fact they are the basis of all maps of this vast territory. Wherever a point or coast-line has been laid down as definitely known by Tebenkof, it may be relied upon as true in contour and latitudinal position. A curious instance confirming this assertion presents itself in the case of the southernmost outlet of the great Yukon river—the Kashunok—indicated as a broad arm on "chart 2" of Tebenkof's atlas. Mr. William H. Dall, in compiling his map for the United States coast survey in 1869, omitted this feature, but examination proved the Russian geographer to be correct. The outlet exists, but is less broad than indicated by Tebenkof.

The large numbers of new names of settlements inserted in this map lie chiefly along the line of my personal exploration.

In the absence of all connected surveys of Alaska absolute correctness cannot be claimed for any map of that country, but in presenting the result of my labors to the public I look upon this map as embodying new information and as an additional guide for future labors in the same direction.

THE GEOGRAPHY AND TOPOGRAPHY OF ALASKA.

The coast of Alaska commences in the south, at latitude $54^{\circ} 40'$, and sweeps in a long curve to the northward and westward for 550 miles to Prince William sound, and thence southward and westward over 700 miles to the extremity of the Aliaska peninsula, whence the Aleutian chain of islands stretches toward the coast of Asia in another long curve, with its convexity to the south. The highest latitude of that great bend of the main coast-line north of Sitka is $60^{\circ} 30'$, while the southern point of the Aliaska peninsula is in latitude 55° . From the strait of Issanakh, which separates the peninsula from the island of Oonimak with its great volcanic peaks covered with eternal snow, the Aleutian islands sweep in a grand curve to the southward and westward for 750 miles, reaching a latitude of $51^{\circ} 30'$ in the meridian of Greenwich, and thence northward and westward 125 miles to Attou, the western extremity of the United States. The Aleutian islands are certainly the summits of a continuation of the main Alaskan range of mountains which sweeps along the Alaskan coast from the boundary around the head of Prince William sound and Cook's inlet and down the Aliaska peninsula. The whole chain, at least that part of it west of Mount Saint Elias, is marked by many volcanic peaks, several of them still active. The mountains of the mainland between Cross sound, the northern line of the Alexander archipelago, and the east shore of the Kenai peninsula are very high, Mount Saint Elias measuring over 18,000 feet, Mounts Crillon and Fairweather being but little less in height. The peaks of the Chugatch alps encircling the north side of Prince William sound loom up grandly under their covering of eternal snow; and on the west side of Cook's inlet are found mountains reaching an elevation of from 10,000 to 12,000 feet. From the Ilyamna volcano down the peninsula the peaks gradually decrease in height: Shishaldin, on Oonimak island, measuring nearly 9,000 feet; the Makushin, on Oonalashka, over 5,000; and the remaining mountains of the chain to the westward varying from 3,000 to 6,000 feet in height. The north side

of the Aliaska peninsula presents a low and sandy shore. The great extent of water lying within the curve of the coast between the southern boundary and the southern end of the Kadiak archipelago has been named by the United States coast survey the gulf of Alaska. North of the Aliaska peninsula the coast has a general northerly and westerly direction to Bering strait, indented by three large bays or sounds—Bristol bay, the Kuskokvim estuary, and Norton sound. In the Arctic the coast of Alaska turns eastward with the sole interruption of Kotzebue sound, in latitude 66° north. The island of Nunivak, the Pribylof group, and Saint Lawrence and Saint Matthew islands are situated off the coast of Bering sea.

From Dixon sound and Portland canal, in latitude $54^{\circ} 40'$, to the Chilkhat inlet and Cross sound, in latitude $59^{\circ} 40'$, the mainland is shielded from the sea by a vast archipelago of islands, large and small, most of them being mountainous throughout, and all covered with a dense growth of spruce, hemlock, and cedar. The dimensions of this great accumulation of islands average about 75 miles east and west and 260 miles northwest and southeast, divided by hundreds of navigable passages. The number of these islands is given as 1,100, divided as follows: Prince of Wales island and those closely surrounding it number 135; from Portland canal to cape Caamaño there are 134; from cape Caamaño to the middle of the Stakhin, 77; between Chatham, Frederick, and Stakhin straits, 350; Admiralty island and those surrounding it number 118; Baranof and adjacent islands, 138; Chatham strait north of Admiralty island contains 29; and Chichagof and islands adjacent to Cross sound, 109. The fiords of Norway and the "scheres" of Finland sink into insignificance before the great dimensions of these straits and sounds. Among the larger passages dividing this archipelago Chatham strait, named by Vancouver, is the most important, stretching in a straight line 195 miles in a northerly direction from cape Ommaney, in latitude $56^{\circ} 10'$, to the mouth of Chilkhat inlet, in latitude $59^{\circ} 40'$, with an average width of seven or eight miles and a great depth of water. Several large passages connect this water-way with other straits to the eastward and also with the sea north of Sitka. Of the latter, one called "Peril" or "Destruction" strait leads directly to Sitka, while the other consists of Cross sound or Icy strait, about 75 miles north of Sitka. The Alexander archipelago embraces a shoreline of nearly 8,000 statute miles.

The outline of this section of Alaska is naturally a very irregular one on account of the numerous straits, bays, and islands. The south coast, facing upon Dixon sound and Portland canal and extending 80 miles from the latter westward to cape Kaigan, exhibits numerous headlands and broken shore, steep hills, and mountains covered with dense forest to their summits. The mountains attain an elevation of from 2,000 to 3,000 feet, with scarcely a valley between them.

The extensive eastern arm of Dixon sound, called Portland canal by Vancouver, forms the southeastern dividing line between British Columbia and Alaska. It begins in latitude $54^{\circ} 41'$, and its northern head is in latitude $55^{\circ} 45'$ and longitude $149^{\circ} 54'$. The inlet is but a little over a mile in width.

On the island of Tongass, situated a little to the westward of the mouth of Portland canal, a military post was established soon after the transfer of Alaska to the United States, but it has since been abandoned; a few of the buildings, however, still remain, surrounded by the easternmost native villages of all Alaska. Cape Fox, the southerly extremity of the mainland within the American territory, is situated in latitude $54^{\circ} 45' 30''$. From the north side of Dixon sound several large passages extend to the northward: the Revilla Gigedo channel, or Tongass narrows, between cape Fox and cape Northumberland; Clarence strait, between cape Northumberland and cape Kaigan; and Cordova bay or strait, between cape Chacon and cape Kaigan, having connection with Bucarelli sound. The largest of these passages, Clarence sound, runs in a northwesterly direction for 120 miles, with an average width of from 15 to 20 miles, and finally mingles its waters with those of Chatham strait, its western shore being formed by Prince of Wales island. Strange to say, this large island, which has been known to the maritime nations of the globe for over a hundred years, still remains unsurveyed, and has been variously named an island and an archipelago, and accounts of natives report numerous navigable passages cutting through it here and there. From the eastern side of Clarence strait great arms penetrate in a general northeasterly direction until they reach the base of the coast mountains; their waters are navigable, the shores bold and covered with timber, and the whole forms an intricacy of inland navigation difficult to describe in detail, and a chart affords but a faint idea of its perplexing grandeur. There seems to be no harbor on the mainland in this vicinity. The port of Wrangell is located on an island of the same name a short distance from the mouth of the Stakhin river, in latitude $56^{\circ} 31'$ and longitude $132^{\circ} 23'$. The Russians had a small stockaded station here called *Rédoute Saint Dionys*, which was subsequently leased to the Hudson Bay Company.

After the acquisition of the country by the United States a military post was established here, but was finally abandoned in 1877. The Stakhin is the largest river of southeastern Alaska, but lies within our boundaries for a distance of only 30 miles in an air-line from its mouth. The Dominion government claims a boundary even nearer to the sea-coast, including the spot where British ocean steamers land cargoes and passengers, and the advent of the British here has destroyed the once large transit trade of Wrangell. The interior of the country adjoining this river is broken into a succession of sharply-defined mountain ranges separated by narrow, deep valleys similar to those between the islands of the coast.

The topography of the Alexander archipelago is the type of that of the interior within our boundaries. Beyond, on the upper river, within the British possessions, there is a large rolling plateau stretching between the coast range

in the west and the prolongation of the Rocky mountains in the east. Like all Alaskan rivers the Stakhin takes its head from a succession of great lakes. A number of glaciers descend from the snow-covered peaks on both sides of the river down to its banks. The largest of these is situated on the right or west bank with its face on the river 4 or 5 miles in width, and its length is said to be over 60 miles. The Indians relate that in ancient times this glacier extended across the river, forming an icy arch over the stream, but in course of time the spring freshets washed away the obstruction. Some officers of the Russian navy attempted to explore this huge glacier to its head, but they probably fell into one of the numerous chasms, as they were never heard from again.

One wide passage from the mouth of the Stakhin to the ocean, called Stakhin strait, runs westward between Prince of Wales island on the south and the Kehk archipelago on the north, reaching the sea between cape Ommaney on Baranof island and Coronation island on the south. Another passage, Prince Frederick sound, runs from the mouth of the Stakhin northward along the coast of the mainland, and then westward between Admiralty island and the Kehk archipelago until it empties into Chatham strait. A branch of this channel, Stephens passage, runs northward between the mainland and Admiralty island until it mingles its waters with those of Chilkhat inlet. At about the middle of its course Takoo inlet opens on the east, and a little beyond this Douglas island divides the strait into two channels. This is the locality where the most promising discoveries of gold placer and quartz mines have thus far been made. Juneau City, or Harrisburg, a mining town of recent growth, is situated on the mainland opposite Douglas island. From the junction of Stephens passage, Chilkhat inlet, and Chatham strait a wide channel, called Cross sound, or Icy strait (by the Russians), opens between the mainland in the north and Chichagof or Hoonia island on the south. A large bay, not heretofore represented on any chart, was definitely located last year on the northern side of Cross sound by the officers of the United States sloops of war Jamestown and Wachuset. Glacier bay extends in a northwesterly direction from the north shore of Cross sound, between Lynn canal or Chilkhat inlet and the Pacific, for a distance of about 40 miles. About 20 miles from its mouth there is an island 5 or 6 miles in length named Willoughby island, and around the shores of the bay are five immense glaciers. The first, in the vicinity of Willoughby island, is about half a mile wide and 150 feet high; the next is about three-quarters of a mile wide and 200 feet high; the third, known among the Indians as the "great glacier", is situated at the head of the bay, and is about half a mile wide and from 200 to 300 feet high; the fourth, on the northern shore of the bay, is about half a mile wide and 150 feet high; and the fifth and smallest is about half a mile wide and 50 feet high. Nearly all the ice floating in this bay and Cross sound comes from these glaciers; the sea washes under them, honeycombs the ice by its incessant lapping, and pieces are broken off constantly. Professor John Muir, an eminent geologist of the Pacific coast, describes another huge glacier located here, as follows:

On the northern shore of Glacier bay, north of Willoughby island, there is a large inlet, from 3 to 4 miles wide at its mouth. It runs to the northward and westward 5 miles, and at its head there is an immense glacier which extends across the head of the inlet for a distance of 3 miles; 10 miles back from its face it is 10 miles wide, and near this, its greatest width, sixteen branches of the first class unite to form one immense glacier; four of the sixteen branches are each over 2 miles wide, while nearly all have tributaries; the distance from the face of the glacier to its farthest removed fountain is about 40 miles.

The port of Sitka is situated on the west coast of Baranof island, in latitude $57^{\circ} 02' 52''$, and longitude $135^{\circ} 17' 45''$.

Westward of Cross sound the coast-mountain range attains an elevation of about 18,000 or 19,000 feet, covered far down with perpetual snow, the highest peaks (Mounts Saint Elias, Fairweather, and Crillon) looming up in silent grandeur above them, visible in clear weather a distance of 150 miles at sea. From Lituya or Port des Français westward the immediate sea-coast is comparatively low, wooded ground, but closely backed by icy declivities that come down from the high mountain ranges, and at the head of Yakutat bay reach the coast land. This narrow strip of low coast, interrupted only in the vicinity of Icy bay by a succession of precipitous glaciers fronting the sea for 15 or 20 miles, extends to the mouth of Copper river. Here the sediment carried down from the mountains has been deposited for thousands of years, until a vast low delta has been formed, through which the waters of the river find their way to the sea in innumerable channels. In many places the swift current has carved large basins and lagoons out of this soft material, the whole presenting the spectacle of a perfect labyrinth of lakes and streams. The mountains rise up abruptly from the northern edge of this flat to a height of 8,000 or 9,000 feet.

Vistas of the far interior are afforded here and there by the gradually-sloping masses of glacier ice. West of the Copper river the foot of the Chugatch alps is bathed by the sea without any intervening low land, with only two or three exceptions, and these have been utilized for the location of settlements. The mountains on the northern side of Prince William sound must reach a height of 10,000 or 12,000 feet, all densely wooded up to about a height of 1,000 feet, and covered with eternal snow from their summits to within 3,000 or 4,000 feet of the sea-level. The interior of Prince William sound on the gulf of Chugatch forms a basin almost entirely land-locked, being sheltered from the south by the islands of Nuchek and Montagne; but although thus surrounded on all sides by land it is by no means a calm and pleasant sheet of water to navigate, as furious gales and "woollies" sweep down the mountain sides without a moment's warning, compelling the luckless traveler in a small craft or canoe to seek the lee of one of the hundreds of islands and capes studding the coast. Immense glaciers on the northern shore

are constantly descending into the sea and shedding fragments of ice, both large and small, that are carried off by the tide in compact fields or loose masses, still more endangering navigation. The western shore of the sound, the northeast coast of the Kenai peninsula, is very much cut up into deep bays and fiords, and everywhere mountains can be seen looming up in the background with snowy peaks and ridges. The deepest indentation in this section of the coast of the peninsula is Resurrection bay, which was long years ago utilized by the Russians as a ship-yard. This bay affords the only harbor in the vicinity, though its entrance is beset with islands and the approach made difficult to sailing-vessels. From Resurrection bay in a southwesterly direction the coast is one succession of deep fiords, but, exposed as it is to the fierce easterly gales prevailing here at nearly all times of the year, it is shunned by navigators, especially because even the deepest and most extensive bays do not afford a single anchorage, so that vessels entering them to find refuge from storms would still be at the mercy of the tides.

The entrance to Cook's inlet, or the gulf of Kenai of the Russians, lies between cape Elizabeth on the southwestern extremity of the Kenai peninsula and cape Douglas, a bold promontory jutting out from the Alaska peninsula. Nearly half way between the two is a group of bleak, naked rocks, called the Barren islands, which, placed as they are in mid-channel of the tide rushing into Cook's inlet from the ocean, cause violent and irregular tidal currents very dangerous and perplexing to the navigator. During calm weather the so-called "tide-rip" will toss a craft about more violently than any sea stirred up by wind; and a sailing-vessel caught within a few miles of the Barren islands in the "tide-rip" without wind is irresistibly drawn to destruction upon the rocks.

Just above its mouth the waters of Cook's inlet widen out into the gulf of Kamyshek on the west and Kuchekmak bay (called "Chugachik" on the coast-survey maps) on the east. On the east shore the mountains are not high, and contain extensive coal-veins of an inferior quality, but on the west the main Alaskan chain of mountains rears up several volcanic peaks to a considerable height, rising abruptly from the sea-coast with a narrow belt of shelving woodland intervening. North of the indentations mentioned the shores of Cook's inlet again approach each other to a distance of not over 30 miles between Anchor point on the east and Mount Isaac on the west. From this point northward and eastward the eastern shore is low and flat, with an elevation of from 50 to 100 feet above the sea. High ridges of mountains traverse the interior and eastern side of the Kenai peninsula, but between them and the coast there is a strip of marshy tundra, wooded along the river-courses and varying from 40 to 50 miles in width. As the inlet contracts still farther, especially between the promontories of East and West Foreland, the tides increase in velocity and violence of action until they attain a speed of 8 or 9 knots with an average vertical rise and fall of 24 to 26 feet. The northeastern extremity of this vast inlet or gulf which Cook entered with the expectation of finding a northwest passage, and, being disappointed, applied to it the name of "Turnagain", equals in tidal phenomena the bay of Fundy. The flood comes in in a huge "bore", with thundering noise and astonishing rapidity, and a traveler advancing with it in a canoe experiences the peculiar sensation of seeing one high bank of clay and gravel after another apparently sinking before him as he is lifted up and carried over by the impouring tide. From the mountains surrounding this branch of the inlet innumerable avalanches sweep down their rocky and wooded slopes, demolishing large sections of forest and piling up rocky débris to such an extent as to cause frequent and total changes in the aspect of the country, while the outlines of the coast undergo equally perceptible modifications from the action of the tides.

What the country north of Cook's inlet is like no civilized man can tell, as in all the years of occupation of the coast by the Caucasian race it has remained a sealed book. The Indians tell us that the rivers lead into lakes and that the lakes are connected by rivers with other lakes again, until finally the waters flow into the basins of the Tennenah and the Yukon; but conflicting with this intermingling of the waters are stories of mountains of immense altitude visible for hundreds of miles. The natives living north of this *terra incognita* give, however, a similar description, which may be accepted until reliable explorers are enabled to penetrate this region.

On the western side of Cook's inlet the main Alaskan chain of mountains, called by Dall the Chigmit range, rises abruptly from the sea in steep ridges and peaks, the highest of the latter being the Rêdoute and the Ilyamna mountains, both volcanic and emitting smoke. Only at two points along this coast within the inlet does low land intervene between the mountains and the shores, at Toyonok and at Kustatan, both of which localities have been utilized by the natives for establishing settlements. Up to the height of about 1,000 feet all these mountains are densely wooded. From Kamyshek gulf, situated between Mount Isaac and cape Douglas, a portage is made over a slight depression in the ridge to the basin of the great lake Ilyamna, but on the southwestern shore of the bay the mountains rise again to a considerable height, culminating in the four peaks to the westward of cape Douglas. The last-named cape is one of the most prominent and boldest in shape of the many Alaskan promontories, jutting out as it does at a right angle for a distance of several miles into the sea, with a sudden descent of over 1,000 feet into the waves of Cook's inlet.

The same chain of mountains extends down the south coast of the peninsula, varying in height between 5,000 and 8,000 feet, with peaks much eroded by glacial and meteorological action. The numerous glaciers existing throughout the upper regions of this mountain chain do not anywhere approach the sea-coast, as is the case with Mount Saint Elias and the Chugatch alps, these formations being found only at high altitudes, generally facing westward and southward.

Two distinct and continuous lines of "water-mark" can be observed along the whole of this chain, one at an altitude of 1,000 feet, the other perhaps 500 or 600 feet above. Both of these lines show the effects of the wash of the ocean for ages, together with many petrifications of mollusks and other marine life. The natural conclusion forced upon the observer is that the whole peninsula of Alaska has undergone two successive periods of elevation from volcanic action, and that this region would afford a highly interesting field of research to geologists. It is a significant fact that no glacial action is observable below the upper sea-level.

The immediate sea-coast here is cut up into innumerable fiords and coves, and lined with rocky islets.

The term "mountain chain" applied above to the elevated portion of the peninsula does not, perhaps, quite describe a very peculiar formation. The mountains or mountain groups are interrupted from time to time by depressions, but these do not at all bear the character of mountain passes, as they consist of low, marshy plains, extending entirely across the peninsula, varying very much in width. A similar formation can be found on the coast of Prince William sound, where outlying spurs of the main chain are frequently divided in the same way. The impression created in the mind of the beholder is not that of a continuous alpine chain, but rather of a series of islands, such as the Aleutians, raised by successive volcanic action until the straits between them are left dry. These depressions serve as the portage routes across the peninsula. A careful observer could easily recognize distinct islands in the mountain groups of Morshovia and of Belkovsky, connected with each other and with the Pavlosk volcanic group only by low, swampy isthmuses. Again, the mountain groups opposite the Shumagin islands, containing the Veniaminof and other volcanoes, loom up, entirely isolated by similar depressions, north and south. Between Moller and Zakharof bays the portage is made in half an hour from the waters of the north Pacific to those of Bering sea.

Other swampy passages lead through from the bays Ohigmik and Kishulik to the north coast of the peninsula. Nearly all these isolated mountain sections bear a peculiar resemblance to the outward shape of the island of Oonimak, the first of the Aleutian chain that is actually separated from the peninsula, though only by a strait too shallow to be navigable. That an elevation of this region has taken place is confirmed by abundant evidence, and altogether it does not seem at all improbable that what now resembles from a distance a long mountain range was once a chain of islands.

At cape Atushagwik the coast of the peninsula approaches nearest to that of Kadiak island, the width of the strait here being only a little over eighteen miles.

In the vicinity of Katmai both coal and petroleum have been found, but not abundant in quantity or excelling in quality.

The volcanic group of the Pavlosk mountains stands, as already mentioned, entirely isolated with its two craters, of which one is still active, while the other is reported to have been extinct since the year 1786. From this region also samples of coal of inferior quality have been procured. South of Pavlof bay another volcano rears its jagged crown, separated both north and south from the mountains.

In the neighborhood of Belkovsky and Morshovia several volcanic peaks can be observed, but they have not been active within historic times.

On rounding the southern extremity of the peninsula and turning northward and eastward a total change in the aspect of the coast can be observed. Low, sandy reaches and slightly elevated moorlands cover the wide interval between the mountains and the shores of Bering sea, interrupted here and there by lake-fed streams and rivers. In the vicinity of Ougachik the volcanic character of the country disappears entirely, the rock formation being altogether of granite and quartz, and pumice-stone and chalk are only washed up by the sea. All along the coast from here we encounter gray granite, hornblende, serpentine, porphyry, and sandstone, but all along, at an altitude of about 300 feet above sea-level, parallel strata containing fossil bivalves appear on the faces of bluffs. As we advance northward the interval between mountains and sea-coast widens, until in the vicinity of lakes Walker and Ilyamna swampy plateaus nearly 100 miles in width are found, dotted with many lakes.

Proceeding northward along the coast of the mainland the first deep indentation of the shore-line is Bristol bay, into which the waters of lake Ilyamna flow through the Kvichak river. From the southern extremity of the Alaska peninsula to this point Port Moller affords the only harbor for shipping, though three rivers, the Sulina, the Igagik, and the Naknek, flow into Bering sea from the mountains in the east. In the vicinity of the mouths of the last two streams the shore is high and rocky, but only few traces of volcanic action can be discovered. North of lake Ilyamna high mountains of the main Alaskan range protrude between that sheet of water and the Nushegak river, its spurs approaching nearest the coast immediately behind the Nushegak post and settlement. Other spurs of the same range of mountains and isolated groups of hills appear at long distances from each other on the coast of Bering sea, the intervals being filled up apparently with alluvial, swampy soil, not altogether level, but gently rolling. The earliest intelligent observer of this region, the Russian missionary Veniaminof, described the conformation of this section of the country as follows:

Slight elevations can be found along the whole extent of the American coast of Bering sea; they are in nearly all cases connected with the mountains in the interior. If the observer ascends to a height the country appears to him like a heaving ocean suddenly become stationary, with its waves transformed into sand and mud; these waves are now covered with vegetation, but their outlines are still very striking. In the midst of this dry sea we find occasionally high, rocky islands entirely separated from the neighboring hills.

To the westward of Nushegak the mountains first reach the coast on both sides of the bay of Kulluk. The summits of this range as seen from the lakes forming the portage between the bays of Kulluk and Nushegak are very jagged in outline, rising abruptly in almost perpendicular blocks and peaks too steep to afford lodgment for the snow. The capes and headlands jutting out from this range into the sea are frequently composed of sandstone worn into fantastic shapes by the action of the tides and changes of temperature. The next great elevated headland is cape Newenham, which forms the terminal point of a rather low range of hills running parallel with the left bank of the Kuskokvim, west of the Tuluksah river. At cape Newenham these hills culminate in two towering peaks between 2,000 and 3,000 feet in height. Between this point and cape Vancouver in the north the country on both sides of the wide estuary of the Kuskokvim is evidently of an alluvial formation, low and swampy. Both at cape Vancouver and on the island lava is found, in addition to many other evidences of volcanic origin; and the same is true of the islands farther off the coast—Saint Matthew and Saint Lawrence. At cape Rumiantzof, in latitude $61^{\circ} 47'$, is another aggregation of volcanic hills rising like mountainous islands from the tundra.

The delta of the great Yukon is of course entirely alluvial, with the exception, perhaps, of the isolated hills of Kusilvak, which give indications of volcanic origin. From the northern mouth of the Yukon eastward the south coast of Norton sound consists of low, rocky hills of lava and basalt. Between the small streams of Pastolik and Pastalak are high bluffs of basalt, and the sandstone cape of Vsachaghik looms up between 400 and 500 feet from the sea-level. The islands of Saint Michael and Stuart are comparatively recent lava formations, and contain several extinct craters. The traditions of the natives here speak of the island of Saint Michael as having risen from the ocean, and old people living in Tebenkof's time related to him that twice within their recollection the whole island was covered by the sea. From Saint Michael northward the chain of low hills composed of lava and basalt runs parallel with the coast, averaging in height from 200 to 300 feet, but at a distance of about 30 miles inland a few peaks attain a height of between 1,000 and 1,500 feet. At cape Denbigh a granite formation appears, jutting out into the sea at a right angle with the volcanic range of hills. The shores of Norton bay are low and all the alluvial deposits contain bones, tusks, and skeletons of the mammoth and mastodon. In the north coast of Norton sound we find the deep indentation of Golovin bay between two high points, cape Derby and Stony cape. The interior at the head of Golovin bay is low, and a portage route extends thence by means of lakes and rivers to Grantley harbor. From Stony cape to cape Rodney the shore is low and level, but in the interior a few high mountains are visible, covered with snow.

Off the coast, not far to the eastward of cape Rodney, there is the small island of Aziak or Sledge island. It has a circumference of only 12 miles, and is covered with large blocks of granite and basalt. The island contains a small village and is the favorite trading mart of the Innuut tribes of both continents. Still farther to the north, opposite to the entrance of Port Clarence, lies King's island, a precipitous mass of rocks some 700 or 800 feet in height, inhabited by about 100 Innuits who have carved their dwelling-places into the almost perpendicular sides of the cliffs at a height of over 50 feet from the sea-level. Only one or two narrow paths lead up from the water's edge to this northern Gibraltar, which also bears traces of volcanic origin.

Port Clarence consists of two capacious basins, the outer one sheltered from the sea by a long semi-circular tongue of land of alluvial formation. The inner basin, Grantley harbor, is surrounded by deep cliffs of slate; and from its head or eastern extremity the portage route leads to Golovin bay, as mentioned above. A chain of hills from 2,000 to 3,000 feet in height extends from Port Clarence on the coast north-northwest, terminating in cape Prince of Wales. The formation of this cape appears to be basaltic, its almost perpendicular lines being frequently interrupted by steep, narrow gulches through which small streams find their way to the sea from the swampy table-land above. In about midchannel between cape Prince of Wales and East cape lies the Diomedegroup, consisting of three small islands, of which two are within the United States boundary. They all rise abruptly from the sea to a height of a few hundred feet, but are level on top.

From cape Prince of Wales eastward and northward the coast is low and swampy until we reach the vicinity of Kotzebue sound and Choris peninsula, where ridges of slate and chalk appear on the coast, generally running parallel with it. The inner shores of the great estuary of Kotzebue sound are generally low, the gravelly soil resting upon a foundation of blue clay. Occasionally this blue clay rises into bluffs of a few hundred feet in height, and the whole formation contains numerous fossil remains of the mammoth and mastodon. The few small islands within the inlet are isolated masses of granite covered in sheltered localities only with a thin coating of splanchnous vegetation.

Kotzebue sound is by far the best harbor in this section of the Arctic ocean, and is much frequented by whalers and illicit traders in liquors and arms. Proceeding hence northward we find several chains of saddle-shaped hills interrupted here and there by wide depressions, a few pyramidal peaks, and steep, isolated rocks. The general formation of these is said to be slate and clay. At cape Lisburne the cliffs rise abruptly to a height of 850 feet above sea-level. Here also slate and chalk seem to predominate, but a short distance to the eastward carboniferous veins of considerable width appear in horizontal layers along the sandstone cliffs overhanging the sea-shore. The same formation continues from here eastward to point Barrow and the eastern boundary of Alaska, receding occasionally to a distance of 10 or 15 miles from the sea-shore, and then advancing again, forming steep but low capes and headlands, the most prominent of which is point Barrow, in latitude $71^{\circ} 22'$.

To complete the description of the topographical and geographical features of continental Alaska it is necessary to follow up the basins of the Yukon and Kuskokvim rivers. The Yukon delta, as already stated above, is altogether alluvial, but between Oonalakleet, on the east shore of Norton sound, and the Yukon river there is a chain of hills consisting of granite and slate forming the water-shed between the Oonalakleet river and the Anvik, a northern tributary of the Yukon. East of the Anvik the mountains increase in height until in the vicinity of Ikogmute, where on the right bank of the river a few peaks rise to a height of 2,500 feet.

The best description extant of the topography of this river is that of Captain O. W. Raymond, United States army, which covers the distance between fort Yukon and the Russian mission at Ikogmute, just mentioned. Captain Raymond states that fort Yukon is situated in latitude $66^{\circ} 33' 47''$ and longitude $145^{\circ} 17' 47''$, at a point where the Yukon receives the waters of the Rat or Porcupine river, a large tributary emptying on the right bank and flowing from its headwaters in a general direction a little south of west. From fort Yukon to the mouth of the Chetaut river, a distance of about 200 miles, the river has a general direction about west-southwest; the country on both sides of the stream being low and level, usually consisting of sand or gravel. The average width of that portion of the river is about three-quarters of a mile, but in some places, measured across its numerous islands, it widens out to 5 or 6 miles. The current through all its passages is extremely rapid, and in many places the deepest channel does not carry more than 3 feet of water. Vegetation on the banks and islands is principally small willow and poplar, with occasional groves of spruce and birch. The principal tributaries in all this section of the river flow from the north, but none of them seem to be of much importance, and no native villages are known to exist.

From the mouth of the Chetaut river, however, the Yukon rapidly changes its character; the islands disappear, the banks rise into hills, and the stream gradually narrows into one channel, deep and rapid, until it finally rushes with great velocity through the Rampart range of hills. The bluffs composing this range rise abruptly from the water's edge, and are composed principally of a hard, greenish rock, though slate is occasionally observed, and at the principal rapids a ledge of granite crosses the river. Most of the hills are covered with groves of spruce and birch, but the trees are all small, and in many places they lie for some distance scattered in every direction, showing the small depth to which their roots descend in the frozen ground and the great force of the prevailing winds. From the Chetaut river to the Rampart rapids, a distance of some 60 miles, the Yukon flows in a direction nearly northwest, and averages about two-thirds of a mile in width, which decreases at the rapids to about 150 yards. The tributaries emptying into this section are also chiefly from the north and small in volume. The first native village met after descending from fort Yukon is situated just below the rapids. From here to Nulato, a distance of some 240 miles, the river has a general direction about west by south. There are, however, many bends, although they are less sudden and numerous than in other portions of the river. After leaving the Rampart range the river widens again and diminishes in velocity. The right bank is generally hilly and abrupt, and on the left, though the shore is generally low or flat, the hills and bluffs occasionally approach the water's edge. The average width of the channel is about three-quarters of a mile, but occasionally groups of low islands cause a widening of the river. About 50 miles below the Nuklukalet station a range of mountains appears on the right bank. This is a succession of well-defined peaks and ridges, describing a beautiful curve of many miles, with its concavity toward the river and its flanks resting upon the water's edge. All this bank is well timbered with spruce, poplar, and birch. The principal tributaries emptying into this section of the river are as follows: From the north, the Tozikakat, the Novikakat, the Melozikakat, and the Koyukuk, and from the south the Tennenah and a few smaller streams. The most important among these tributaries in size and beauty—in fact, chief among all the tributaries of the Yukon—is the Tennenah, the river of the mountains. It empties into the Yukon about 30 miles below the Ramparts, and its turbid waters increase the current of the main river for a long distance. It flows apparently in a generally northwestern direction, its headwaters approaching the upper Yukon within five or six days' "Indian" travel. The mountains overhanging its upper course are said to be steep and to contain auriferous deposits or veins; and samples of surface-gold from this section have been exhibited. At the mouth of the Tennenah is the great trading-ground called Nuklukalet, where the Indians inhabiting the banks of this tributary are accustomed to congregate in the spring and meet the white traders and the few scattered bands of natives roaming over the hunting-grounds between the Yukon and the Kuskokvim. Not far east of Nulato the Koyukuk empties into the Yukon from the north, forming a route of traffic between the river and Kotzebue sound. From Nulato, situated some 50 miles south of the mission, to Andreievsky, the distance is about 350 miles, and the river has the following approximate directions: From Nulato to Anvik, south-southwest; from Anvik to the upper entrance of Chageluk slough, south-southeast; from the upper entrance of the slough to the great bend, southwest; from the great bend to Andreievsky, west by south. It is difficult to convey an idea of this portion of the river, as its numerous windings, its hundreds of islands, its bars and shoals, ever changing and shifting, baffle the traveler in his search for a navigable channel. Generally speaking, the right bank is high, exhibiting many bluffs of sand and rock much eroded by the ice torrents of the spring. The ice sometimes undermines the high banks to a distance of 20 or 30 feet, and the trees standing on the projecting tops of the banks are loosened by the action of frost and water and precipitated into the stream beneath, and thus the river goes on widening and shoaling, and floating immense quantities of drift-wood down to the sea. Sometimes the right bank rises into high hills, but the left bank is generally low and level; here and there,

however, a few isolated hills are seen standing back a mile or two from the water, and for nearly the whole distance a range of distant mountains parallel to the left shore is visible. In these mountains lie the upper branches of the great river Kuskokvim.

Sandstone and slate continue throughout this portion of the Yukon valley, but on the lower part a dark volcanic rock makes its appearance. Between a point near Andreievsky and the sea no rocks can be found anywhere along the river. The hills on the right bank are generally well covered with spruce and poplar, occasionally intermingled with a little birch, but owing to the coldness of the winter these trees seldom grow to great size. The left bank, on the other hand, is generally covered with a low thicket of willow and alder. This section of the river has few tributaries of importance, but there are many small streams, entering usually from the north. The principal streams are the Takaiak, which empties into the Yukon about 50 miles below Nulato, and the Anvik, debouching from the north about 160 miles below that point. The latter has its source in the mountain ranges which run parallel with the sea-coast; its banks are high and steep, and the very shallow waters run with great velocity. Two rivers empty into the Yukon in this vicinity from the south: the Kaiukak river, about 40 miles below Nulato, and the Chageluk. About 130 miles below Nulato the Yukon separates into two branches, the main stream pursuing a southerly course, while the lesser branch, running at first a little south of east, makes finally a great bend to the south and west and enters the main river again about 60 miles below the point of separation. This lesser branch is called Chageluk slough, and into it, a few miles from its entrance, empties the Chageluk or Innoko river. A little below Andreievsky the Yukon bends abruptly to the north and runs about north by west from this point to the sea. The three principal outlets of the great river are the Ap-hun or upper, the Kvikhpak or middle, and the Kusilvak, or lower mouth. The Ap-hun outlet is about 40 miles in length and has an average width of perhaps one-third of a mile.

Of the upper portion of the Kuskokvim river I have no authentic reports, but the natives relate that along its several branches the country is a level plain encircled on all sides by tremendous mountains. All through its upper course the current is said to be exceedingly sluggish, but at some point east of the last known settlement of Napaimute there must be a break through some natural barrier, causing a rapid descent and corresponding increase of velocity of the river. From this point to the great bend in the vicinity of Kaltkhagamute the Kuskokvim runs nearly due west.

The mountains eastward of the R doute Kalmakovsky are high, heavily timbered around the base, and give ample evidence of the presence of mineral deposits; veins of quartz, cinnabar, and other ores being easily traced wherever the slopes and bluffs are exposed to view. Throughout the whole valley of the river the observer is struck with the wide difference existing between this formation and that of the Yukon. The bed is hard and gravelly throughout, and the vegetation on its banks more profuse and of greater variety than we find it on the larger river. About 200 miles from its mouth the Kuskokvim makes a bend to the southward, and from this point the hills disappear gradually, and at the same time the forests of alder and spruce recede from the banks until for the last 150 miles of the river course endless marshy plains extend on both sides as far as the eye can see. Between the Yukon and the Kuskokvim, west of the general portage route, there is a vast system of lakes connected by streams with both rivers, but of this region very little is known beyond the fact that it is thickly settled by people holding little intercourse with their neighbors inhabiting the river basins.

Turning now to the islands of western Alaska we begin with the Kadiak group, consisting, in addition to the large island from which it takes its name, of the islands of Shuiak, Afognak, Malina, Marmot, Spruce, Ougak, Satkhilidak, Nazikak, Sitkhinak, Tugidak, and Onganik, beside a number of others too small to mention by name. All of these islands are covered with mountains and hills, a few of them looming up between 2,000 and 3,000 feet into the regions of eternal snow. From the northern extremity of Shuiak to a line from the head of Ougak bay or Eagle harbor to Ouganik bay on the west coast the islands are heavily timbered with spruce, attaining in some localities a large size. This timber-line is quite sharply defined, though along the water-courses throughout the group a stunted growth of creeping willow exists, and a heavy carpet of grasses and moss covers the hills and mountains to the very summits. The geological formation consists chiefly of slate, porphyry, and basalt.

The bays indenting this group of islands are numerous and deep, affording the greatest facility for small fishing and trading craft. The most important at the present day is that of Saint Paul harbor, on the northern side of the gulf of Chiniak, protected from the sea by Long and Wood islands. A short distance south of Chiniak bay is Eagle harbor or Ougak bay connected by a series of lakes with another deep fiord still farther south, the bay of Killuda. This harbor is again connected, by a sheltered passage between the islands of Kadiak and Satkhilidak, with the harbor or bay of Three Saints, where the first permanent settlement of the Russians on Kadiak was located. Next in order is the bay of Kaguiak, a capacious basin sheltered from all but north winds. Passing around the southern end of Kadiak island we come to the large bay of Alitak, whence westward and northward a long reach of rocky coast extends without indentation or harbor of any kind until we pass the great fishing-station of Karluk river and enter the bay of Ooiak, the deepest fiord on the island, divided from the bay of Killuda on the eastern side by only a narrow range of hills. To the northward of this bay there is one other indentation on Kadiak island, the bay of Ouganik, divided into two arms by the island of the same name,

and one large bay on the west side of Afognak island, named Paramonof bay. With the exception of Spruce and Wood islands the smaller islands of this group are uninhabited, and serve only as hunting-grounds for the inhabitants of Kadiak and Afognak.

Southward from the Kadiak archipelago are the Semidi group and the island of Ookanok (also called Chirikof island). They are hilly and evidently of volcanic origin, earthquake shocks being still of frequent occurrence. In the autumn of the year 1880, when the inhabitants of Sitka, 600 miles to the eastward, were startled by a violent earthquake, similar phenomena were observed on these islands, while no subterranean movement was felt at Kadiak and the adjoining islands.

The next large group of islands is the Shumagin, consisting of the islands of Ounga (the most important of the group), Popof, Korovin, Andromika, Nagai, Great Koniusha, Little Koniusha, Simeonof, Nuniak, and a number of small rocky islets. This group, which received its name from Bering during his second voyage, bears indications of volcanic origin, great changes in the elevation of points and headlands having taken place within historic times. In geological formation they are nearly all alike, consisting of slate and porphyry, but on Ounga island are extensive veins of bituminous coal. The product of these veins has, however, been declared unfit for steaming or manufacturing purposes, and, after expensive experiments continued through a long series of years, the mines have been finally abandoned. The most important cod-fish banks now utilized by San Francisco fishermen in Alaska are located in the immediate vicinity of the Shumagin group. Between the Shumagin islands and Oonimak, the first of the Aleutian group, the sea is dotted with a multitude of islands, reefs, and rocks of volcanic origin too numerous to describe in detail; they form the most important sea-otter hunting-ground of all Alaska, extending from Peregrebnoi island in the north to Sannakh in the south.

The island of Oonimak is about 60 miles in length, extending from northeast to southwest, closely resembling in its general formation the Aliaska peninsula, from which it is separated only by a shallow strait. The most prominent features of this island are its two volcanic peaks, the Shishaldin, rising in one elegant pyramid to a height of between 8,000 and 9,000 feet, and the Pogromny, between 5,000 and 6,000 feet in height. The whole island has been described as the vault of a subterranean smelting-furnace with many chimneys, through which flames, sparks, and ashes ascend from the molten masses beneath. It has been and is still the theater of the most constant volcanic action in all Alaska. In the earliest times since the discovery of the island by the Russians whole ridges of mountain peaks have been observed to split open and emit huge flames, torrents of lava, and clouds of ashes. These manifestations were always accompanied by the most violent earthquakes, tidal waves, and floods, the latter caused by the sudden melting of masses of ice and snow on the mountain tops. The greatest activity on record occurred in 1796, 1824, and 1825, and as late as 1827 burning lava was observed descending from the craters. Oonimak has also from time immemorial been the Aleutians' great storehouse, from which they obtain sulphur and obsidian, the latter being employed in the manufacture of knives, spears, and arrow-heads. The Russian missionary Veniaminof, who witnessed one of these eruptions in the year 1825, describes the event as follows:

On the 10th of March, 1825, after a prolonged subterranean noise, resembling a heavy cannonade which was plainly heard on the islands of Oonalashka, Akoon, and the southern end of the Aliaska peninsula, a low ridge on the northeast end of Oonimak opened in five places with violent emissions of flames and great masses of black ashes, covering the country for miles around. The ice and snow on the mountain tops melted and descended in a terrific torrent 5 to 10 miles in width on the eastern side of the island. Until late in the autumn the sea on that coast was turbid after this eruption. The Shishaldin crater, which up to that time had also emitted flames, continued to smoke only, while about midway between summit and base a new crater was formed, which was still smoking in the year 1831. On the 11th of October, 1826, a small peak in the interior of the island opened under violent explosion of fire and a rain of ashes, which covered not only the southern end of Aliaska peninsula, but Sannakh and Ounga and other adjoining islands. Since that time smoke comes out of many places among the loose masses of rocks on the mountain side, and all the streams and ponds in the vicinity are hot enough to emit steam in midsummer.

Between Oonimak and Oonalashka there is a group of islands which was formerly named the Krenitzin group. The most important of this group are Avatanok, Tigalda, Ougamak, Akoon, Akutan, and Ounalga. The latter island has no high mountains, but is very rocky, and its coast consists of steep, almost inaccessible cliffs. The island of Akutan is nearly circular in form, and has a group of mountains culminating in a volcanic peak 3,300 feet in height. Smoke still issues occasionally from the crater, the inner side of which is lined with deposits of sulphur of great purity, and many hot springs emerge from the fissures and crevices, in one of which the temperature is sufficiently high to boil meat and fish. The island of Akoon is comparatively low, but smoke can be seen to ascend from one of its peaks. The natives report deposits of coal in the southeast side of the island, and Tigalda, high and rocky at its south end and level in the north, also exhibits a carboniferous formation.

The great island of Oonalashka, the most important of the Aleutian chain, is about 120 miles long and 40 miles wide. Three separate groups of mountains occupy the coast and interior: The Makushin group, consisting of two parallel chains running northwest and southeast, between the bay of Makushin and Captain's harbor, with the volcanic peak Makushin 4,000 or 5,000 feet in height; the Bobrovoy or Otter mountain, extending from northeast to southwest, between Captain's harbor and Beaver bay; and the Koshigin mountains, extending through the southern portion of the island from northeast to southwest. The snow never leaves the summits of these mountains.

The volcano of Makushin lies about 20 miles north of the anchorage in Captain's harbor, and is an almost perfect cone in shape, blunted a little at its apex, where the crater is located. No flames or lava have been emitted

by this volcano in the memory of several generations; but smoke still issues at brief intervals, and earthquakes and subterranean noises are of frequent occurrence. Russian naval officers who visited the island at long intervals in the early part of this century assert most positively that many of the points and ridges changed entirely in outline owing to this volcanic action. A lake near Vessleovsky cape, at the west entrance to Captain's harbor, was by Veniaminof described as a lagoon connected with the sea, but at the present day it is separated from the latter by quite a wide strip of rocky land.

The geological formation of Oonalashka consists chiefly of granite, basalt, porphyry, and slate in alternate layers, and a few hot springs are found at various points on the island.

Three vast bays indent the shores of Oonalashka island. One opening to the northward—Captain's harbor—is divided into two branches by the island of Amaknak, and is the site of the principal settlement of Iliuliuk. Another bay, the largest in size on the island, opens into the Pacific in a northeastern direction; this is Bobrovoy or Sea-otter bay, nearly 30 miles in length. A narrow isthmus separates this gulf from the bay of Makushin, opening westward into Bering sea. The whole south coast of the island is cut up into deep fiords, but as they are open to all southerly and easterly winds they afford no anchorage for shipping, with the exception perhaps of the small bay of Kiliuliuk, whence a portage route leads across to the bay of Kashiga, debouching into Oumnak strait. An excellent harbor opening into the same passage is the bay of Chernovsky, near the southwestern extremity of the island.

Separated from Oonalashka by a pass only 5 miles in width is the island of Oumnak, nearly 60 miles in length but not over 10 miles wide at any point. The southern extremity of this island is low, rolling prairie-land, rising gradually into a chain of mountains crowned with snow-covered summits, two of which are active volcanoes. The southernmost of these is situated a short distance northward of the present settlement. The larger and more important is the Vsevidof, which rears its head nearly in the middle of the island, just south of Inanudakh bay. Another extinct crater is located near the north end of Oumnak island, and bears the name of Tulik. Earthquakes and rumbling noises are of frequent occurrence here, and as late as the year 1878 a new crater, emitting steam and boiling mud, after a brief eruption of flames and ashes, appeared in the sloping plain between the southern volcano and the settlement. The whole coast of the island is beset with rocks to such an extent that it is shunned by the navigators. The eruptions of ashes and rocks from the active craters frequently fill up the creeks and mountain streams and seriously interfere with the periodical runs of salmon and other fish. These disturbances also affect the neighboring coast of Oonalashka; and at the present day only one out of eleven populous villages noted by the earlier visitors is in existence. On the northeastern side of the Vsevidof crater a geyser has been observed, in which the water rises every fifteen minutes to a height of about two feet, the temperature being sufficient to boil meat or fish; but the stream rises out of a gravel deposit and disappears without leaving any trace of opening or funnel behind. The natives report a large number of hot springs in various portions of the island. The general formation of the mountain seems to be porphyry and granite, intersected with large masses of obsidian.

To the northward of Oumnak, at a distance of between 10 and 12 miles, lies the small rocky island of Bogoslov (Saint John the Theologian). This island or crater appeared above the waters of Bering sea within historic times. On the 18th of May, 1796, a Russian trader named Krukof found himself on the north end of Oumnak island; the weather was thick and stormy, and there were many indications of volcanic disturbance, but on the following morning the atmosphere cleared and a column of smoke became visible some distance at sea. Toward evening a black object appeared under the smoke, and during the night large flames of such brilliancy rose up from the same point that on the island night was converted into day, and at the same time an earthquake with thundering noises shook the whole island, while rocks were occasionally thrown across the sea from the new crater. With sunrise of the third day the earthquake ceased, the flames went down, and the newly-created island loomed up in the shape of a cone. A month later Krukof found the peak considerably higher, still emitting fire and ashes; later, however, the flames ceased altogether, and volcanic action was confined to the emission of steam and smoke. Four years later, in 1800, the smoke had ceased, and when eight years had elapsed since the first appearance of the island some hunters visited its shore, and at that time the sea immediately surrounding it was still warm, and the rock too hot to permit of landing, but a few years later the cliffs of Bogoslov had cooled sufficiently to attract a large number of sea-lions. From the time of its first appearance until 1823 successive visitors reported an increase of both height and circumference, but from that date no further elevation seems to have taken place.

The next group of islands to the westward bears the common name of Four Peaks islands, and consists of Ouliaga, Kigalgin, Kagamil, Chuginadak, and Unaska, and a few smaller rocky islets. On nearly all these islets we find craters which are or have been active within historic times, and smoke still issues from those on Unaska, Kagamil, and Amukhta. Earthquakes are frequent, and deposits of lava, ashes, obsidian, and other volcanic products abound everywhere. But one of the islands, Chuginadak, affords an anchorage for shipping, and consequently the group is rarely visited except by sea-otter hunters. In former years many villages existed here, and in cavities of the island of Kagamil a large collection of mummies in a very good state of preservation has been discovered.

The Andreianovsky group of islands, named after its discoverer, the Russian trader Andreian Tolstykh, consists of 14 or 15 large islands and a number of small ones. The easternmost of these is Sigum, nearly circular in shape,

mountainous throughout, with several smoking craters, without harbors, and uninhabited. Southwest of Sigum lies the island of Amlia, extending from east to west about 30 miles but only 2 or 3 miles in width. A long chain of conical peaks traverses the whole length of the island, but no active craters are known to exist. A few streams empty into the Pacific in the south and into Bering sea in the north, but only one small anchorage exists on the south coast. At the time of its first discovery Amlia contained several villages, but they have long since been abandoned.

The largest of this group is the island of Atkha. It resembles Oonalashka in shape, but its indentations are less deep and not so easily accessible. Near the north point of the island there is a volcano called the Korovinsky, nearly 5,000 feet in height, and a few miles to the south another rises to almost the same elevation. The Kliutcheva (or Springs volcano), and the third, somewhat less in height, though also covered with eternal snow, is situated near the northeastern extremity of the island, and was named Sarychef. A few smaller volcanoes are scattered along the gradually-descending mountain range forming the backbone of the island. The northernmost only of these craters is active at the present day, emitting smoke and ashes, but earthquakes and subterranean noises are felt and heard all over the island. The largest indentation of Atkha is on the west side, in the bay of Korovinsky, on the shores of which the principal settlement was formerly located. The old establishment was removed, however, to Nazan bay, nearly opposite, on the east coast of the island. In neither of these bays was the anchorage very desirable, one being exposed to westerly, the other to easterly winds. About midway on the west coast is a sheltered harbor, Banner bay, extending some 5 or 6 miles inland, and separated from a corresponding opening on the eastern coast by a low, narrow isthmus. The mountains in the northern part of Atkha exhibit the only glacial formation known to exist on these islands west of Oonimak. Hot springs are plentiful throughout the interior, and at two or three points the natives report mud craters throwing up liquid masses varying in color from red to green, blue, and a brilliant yellow.

Of the small islands adjoining Atkha in the west but little is known beyond the fact that they are mountainous, uninhabited, and evidently of volcanic origin. The nearest large island is that of Sitkhin, which is round in shape and mountainous, culminating in a snow-covered peak 5,000 feet in height, which was reported by Sarychef as emitting flames in the year 1792, but at present no volcanic action is observed beyond hot springs emerging from the rocks in many places.

To the westward of Sitkhin rises the large island of Adakh, covered with mountains and indented with several bays, of which, however, only two, Kiliuliuk bay on the west and Shagakh on the east, afford anchorage to vessels. One grand peak rising up nearly in the center of the island was called the "white crater" by the Russians, but at present it seems to be extinct; hot springs abound, however, throughout the mountains and valleys of the island.

The islands of Kanaga and Tanaga, in the vicinity of Adakh in the west, also exhibit a succession of volcanic peaks rising abruptly from the sea, a few of them still smoking and grumbling. Only on Tanaga island is there an anchorage on its western shore, in the bay of Slava-Rossia.

The small island of Anangussikh, or Gorelei, is situated due west of Tanaga, and consists of one immense peak rising abruptly from the sea, with a circumference of about 18 miles. Several of the Russian explorers estimated the height of this peak greater than that of Shishaldin, or more than 9,000 feet, but no recent measurements to confirm this statement have been made.

Throughout the whole group of the Andreianovsky islands Atkha contains the only settlement; all the other islands, though once populous, now serving only as temporary hunting-grounds.

The next group of islands to the westward, named by the Russians the Rat islands, consist of a mass of small volcanic peaks, with the exception of two of somewhat larger dimensions—the islands of Amchitka and Kyshka. Hot springs are found on nearly every island of the group, but smoking craters exist only on Semiseisopochnoi, of Seven Peak islands, and on Sitkhin; the latter being probably the westernmost active volcano of the Aleutian chain. The only anchorages to be found in this whole group are on the west coasts of Kyshka and Amchitka respectively.

The last subdivision of the Aleutian chain was classed by the Russians as a separate group (the Near islands), and consists of the islands of Attou and Agatoo, the latter situated a short distance southeast of the former. The formation of these two islands seems to be very similar to those to the eastward, but no volcanic phenomena have been observed here within historic times. On the northeastern coast of Attou the only settlement is situated on the small sheltered bay of Chichagof, but another anchorage, called Massacre bay, exists on the south coast. The island of Agatoo has long since been abandoned by its inhabitants, and affords no shelter to sailing-craft.

THE VOLCANIC REGION OF ALASKA.

As the best authority extant on the volcanic manifestations in Alaska I use a translation of Dr. C. Grewingk's *Treatise on the volcanic character of certain regions of the Russian possessions*, published in the year 1850, in the *Proceedings of the Mineralogical Society in St. Petersburg*. Grewingk writes as follows:

We know of no more extensive theater of volcanic activity than the Aleutian islands, the Aliaska peninsula, and the west coast of Cook's inlet. Here we have confined within the limits of a single century all the known phenomena of this kind: the elevation of mountain chains and islands, the sinking of extensive tracts of the earth's surface, earthquakes, eruptions of lava, ashes, and mud, the

hot springs, and exhalations of steam and sulphuric gases. Not only does the geological formation of most of the islands and a portion of the continent point to volcanic origin or elevation, but we have definite information of volcanic activity on twenty-five of the Aleutian islands. On these islands forty-eight craters have been enumerated by Veniaminof and other conscientious observers, and in addition to these we have on the Alaska peninsula four volcanoes, two on Cook's inlet, one on Prince William sound, one on Copper river, and one in the vicinity of Sitka (Mount Edgecombe); three other peaks situated between Edgecombe and the Copper river have not been definitely ascertained to be volcanic. The distance from the Wrangell volcano, in the vicinity of Copper river, to the Sitkan island is 1,505 nautical miles. We have every reason to believe that the Near islands (the westernmost of the Aleutian group) are also extinct craters; and thus we find one continuous chain of volcanoes from Wrangell to the near Commander islands (Bering and Copper), pointing to the existence of a subterranean channel of lava finding its outlet or breathing-hole through the craters of this region. The nearest volcanoes to the south of this line are Mount Baker on the American continent, in latitude $48^{\circ} 48'$, and the craters of the Kurile chain of islands on the coast of Asia. That a subterranean connection exists between this long line of craters is indicated by the fact that whenever volcanic activity grows slack in one section of the chain it increases in violence at some other point, an observation which has been confirmed by all observers. From all information on the subject at our disposal it appears that the craters of Mounts Fairweather, Crillon, and Edgecombe, and Mount Calder (Prince of Wales island), have not been active since the middle of the last century, and as the universal law of volcanic activity seems to place the frequency of eruptions in an inverse ratio to the height of the volcanoes, we might reasonably expect that the season of rest for these craters will be a prolonged one; but how terrible and devastating must be the awakening of the sleeping furnaces when it occurs! With regard to Mount Saint Elias, we have many authentic data as to its volcanic nature. Belcher and Wrangell consider that the black ridges descending from the summits of the mountains, and the fact that the glaciers on Copper river exhibit a covering of vegetation, as proof of the volcanic character of the mountain. The first phenomena may rest entirely upon an optical delusion, as it is not at all certain that the black streaks consist of lava or ashes, while the appearance of vegetation on the surface of glaciers on Copper river is very probably due to the fall of volcanic ashes; the latter phenomenon may be traced as easily and with far more probability to the Wrangell volcano.

With a feeling of relief we abandon this field of speculation and enter upon a review of the volcanic phenomena of these regions in geographical as well as chronological order. All the editions upon which our list is founded came from the reports of the accidental visits of European travelers and explorers. Owing to the low grade of civilization of the natives and even of the colonists it has been exceedingly difficult to collect the necessary information from inhabitants of the country, but such as it is I have made use of all material accessible to me. We first review the volcanic manifestations as far as known in geographical order.

On Prince of Wales island, Mount Calder, located in latitude $56^{\circ} 15'$ and longitude $133^{\circ} 30'$, was active (?) in the year 1775, according to Don Antonio Maurelle; not active in 1793, according to Vancouver, and reported in the same condition by all later observers. On Baranof island we have hot springs, situated in latitude $56^{\circ} 51'$ and longitude $135^{\circ} 19'$, which were reported flowing by Baranof in 1779, and have remained in the same condition. On the mainland we have Mount Crillon, in latitude $58^{\circ} 45'$ and longitude 137° , reported not active by Cook in 1778. Mount Fairweather, in latitude 59° , longitude $137^{\circ} 30'$, reported not active by La Pérouse in the years 1786 to 1788; Mount Saint Elias, in latitude $60^{\circ} 17'$, longitude $140^{\circ} 51'$, reported not active by Vancouver in 1794, and continued in the same condition. The coast crater on Prince William sound (?), in latitude $60^{\circ} 54'$, reported in eruption by Don Fidalgo; Mount Wrangell, in latitude 62° and longitude 142° , discovered in 1819, and reported active by Kliwosky and Wrangell. The high peak or Rêdoute mountain, latitude $60^{\circ} 30'$, longitude $152^{\circ} 145'$ (west coast of Cook's inlet), reported smoking since 1819 by Wrangell and others. Mount Ilyamna, latitude 60° , longitude $153^{\circ} 15'$, reported not active by Bering in 1741 (?) and active by Cook in 1778; also by Don Artsaga in 1779; also in 1763 by Portlock and Dixon; and in 1793 by Vancouver, and also by all later observers, and still continues the same. On the Alaska peninsula the Veniaminof crater, latitude 56° , longitude 158° , reported smoking by Veniaminof from 1830 to 1840; hot springs, in the same vicinity, reported flowing by Veniaminof at the same time, and continue in the same condition; Pavlovsky crater, in latitude $55^{\circ} 24'$ and longitude $161^{\circ} 48'$, reported active from 1762 to 1763 by the promyshleniks; according to Chamisso one of its craters became extinct in 1786, reported active by Sarychef in 1790, also by all later observers, and is still smoking. The craters of Medvednikof and Morshova, in latitude 55° and longitude $162^{\circ} 37'$, reported not active in 1768 and 1769 by Krenitzin, but active in 1790 by Sarychef, now smoking occasionally; hot springs at the entrance of Morshova bay, in latitude $54^{\circ} 34'$ and longitude $152^{\circ} 25'$, were reported flowing in 1832 by Lütke. Hot springs, on the peninsula, in latitude 55° , longitude $163^{\circ} 10'$, were reported by Veniaminof as flowing in 1838; hot springs, on Moller bay, latitude $55^{\circ} 45'$, longitude $160^{\circ} 30'$, were reported flowing in 1828 by Lütke and in 1840 by Veniaminof, and still continue in the same condition. The volcanic island of Amnak, latitude $55^{\circ} 28'$, longitude $163^{\circ} 15'$, was active during the last century, but not active since 1804, according to Krusenstern. On Oonimak island the volcano Khaginak, in latitude (?), has not been active within historic times, though Veniaminof, from native accounts, computed that its crater was formed in the year 1690.

Of the two other volcanoes on this island, Shishaldin, in latitude $54^{\circ} 45'$, longitude 164° , and Pogromny, latitude $54^{\circ} 30'$ and longitude $164^{\circ} 45'$, we have the following data:

In the years 1775 to 1778 the Shishaldin was reported as occasionally active by Zailkof; in 1778 Shishaldin was reported smoking by Cook, and in 1790 by Sauer; it was also reported smoking in 1824 by Veniaminof, and as in full eruption in 1825; in 1826 a new eruption was reported by Veniaminof and also increased activity from 1827 to 1829, and from 1830 to 1831. Pogromny had its greatest activity in the year 1795, and another violent eruption in 1827, and in the autumn of 1830; both are still smoking.

In the island of Akoon a crater, situated in latitude $54^{\circ} 17'$, longitude $165^{\circ} 33'$, was reported by the promyshleniks as not active between 1765 and 1770; in the year 1828 Veniaminof reported it smoking. Hot springs were reported flowing in 1828, and still continue in the same condition. The crater on Akutan island, latitude 50° , longitude $165^{\circ} 54'$, was reported not active in 1778 by Cook, and also by Shelikhof in 1785; it was reported smoking by Sauer and Sarychef in 1790; also by Veniaminof and later observers. On Oonalashka island the Makushin crater, in latitude $53^{\circ} 52'$, longitude $166^{\circ} 48'$, was reported active by Krenitzin in 1768, not active by Cook in 1778, extinct by Sauer in 1790 and 1792, smoking by Sarychef in the same year. In 1802 an eruption, accompanied with earthquake, was reported by Langsdorff; in 1816 and 1817 Eschholz reported it as not active; in 1880 Veniaminof reports earthquakes, and in 1826 an eruption; later observers reported it still smoking. On Oumnak island the promyshleniks reported no volcanic phenomena between 1765 and 1770; in 1784 the Vsevidof crater was still smoking; in 1790 it was reported smoking by Sarychef. From 1817 to 1820 violent eruptions and earthquakes took place throughout the whole Oumnak range. In 1824 and in 1830 other eruptions were reported by Lütke and Postels. The volcanic island of Bogoslov rose from the sea in 1796 with earthquake and eruptions; reported as not smoking in 1800 by Kotzebue; also in 1802 by Langsdorff; reported smoking in 1804 by Kotzebue; in eruption in 1806 by Langsdorff; throwing up stones in 1814 by Baranof; decreasing in height in 1815, also by Baranof; not active in 1816 and 1817, according to Eschholz, and smoking again in 1820, according to Dr. Stein; reported by Veniaminof as no longer smoking since 1823. The volcano on Kagamil island, in latitude $52^{\circ} 53'$, longitude $169^{\circ} 30'$, was reported to have been active by Lütke and Postels. In 1828 Veniaminof reported only hot springs, an exhalation of gases, and subterranean noises. On the island of Tanaga, in latitude 53° , longitude $169^{\circ} 45'$, the volcano is reported not active by Bragin in 1774; in 1828 Lütke reported it active, with many hot springs at its base. The volcanoes of Ouliagan and Chegulakh, in latitude $52^{\circ} 53'$ and longitude $169^{\circ} 40'$,

and latitude $53^{\circ} 08'$, longitude $169^{\circ} 24'$, respectively, have not been active since the end of the eighteenth century. The volcano of Unaska, latitude $52^{\circ} 40'$, longitude $170^{\circ} 28'$, was reported smoking in April, 1817, by Choris; in eruption in 1824 by Lütke, and in 1830 by Veniaminof. The volcano of Amukhta, in latitude $52^{\circ} 30'$, longitude $171^{\circ} 04'$, reported in full eruption in June, 1786, by Shelikhof and in 1790 by Sarychef; in 1830 it was reported not active by Lütke, but smoking by later observers. The volcano of Signam, in latitude $52^{\circ} 20'$, longitude $172^{\circ} 12'$, with mud craters and hot springs, was reported active by Sarychef in 1790, and smoking by Lütke in 1827; also by later observers. The five craters on the island of Atkha were reported active from time to time since 1760 by Zaïkof, Tolstykh, Lütke, and others. The Sarychef crater was considered extinct since 1792, but broke out again in 1812, according to Vassiler. The Korovinsky crater was in eruption and smoking in 1829 and 1830. The Konik peak was reported smoking in 1827 by Lütke; in 1829 by Ingenström; also by later observers.

The volcano on Sitkhan island, latitude $52^{\circ} 04'$, longitude $167^{\circ} 02'$, was reported not active by Tolstykh in 1760, in eruption by Sarychef in 1792, covered with snow and smoking by Ingenström in 1829, also by later observers. The White volcano, on Adakh, in latitude $52^{\circ} 45'$, longitude $176^{\circ} 30'$, was reported active in 1760 by Tolstykh; also in 1784 by Shelikhof; and in 1790 and 1791 by Sauer and Sarychef. The volcano of Kanaga, latitude 52° , longitude $176^{\circ} 50'$, was reported active, with many hot springs at its base, by Tolstykh in 1763, also by Shelikhof in 1768; smoking in 1790 and 1791 by Sarychef, and in 1827 by Lütke, and by later observers. The crater on Tanaga, in latitude 52° , longitude 178° , was reported active from 1763 to 1770 by promyshlenniks, and smoking by Sauer in 1791, and by later observers. The volcano on Goreloi, latitude $51^{\circ} 43'$, longitude $78^{\circ} 45'$, was reported active in 1760 by Zaïkof, in eruption by Sarychef in 1792, smoking by Ingenström in 1829. The volcano of Semiseisopochnoi, latitude 52° , longitude $180^{\circ} 15'$, reported smoking in 1772 by Bragin; also by Sarychef in 1790 and 1792; by Lütke in 1830, and by later observers. The volcano of Sitignak, latitude $51^{\circ} 39'$, longitude $181^{\circ} 33'$, was reported active by Bragin in 1776; and finally the crater of Sitkhan, in latitude 52° and longitude $181^{\circ} 30'$, reported smoking by Lütke in 1828.

CHRONOLOGICAL REVIEW OF VOLCANIC PHENOMENA ON THE ALEUTIAN ISLANDS AND THE NORTHWEST COAST OF AMERICA FROM THE YEAR 1690.

- Formation of the crater on the highest peak of Oonimak island east of the Shishaldin, probably the Khaginaak.
 1700 to 1710.—Volcanic activity on the Ouliagan, Chegulakh, and Amnak.
 1741.—Ilyamna mountain not active. (?)
 1760.—Adakh, Goreloi, Chechina, and Atkha smoking; Koniushy island rising.
 1762.—Pavlovsky volcano, on Aliaska peninsula active.
 1763.—Volcano on Tanaga active (until 1770).
 1768.—The Makushin and another volcano on Oonalashka active; also the Medvednikof and Morshova on the peninsula.
 1770.—Amukhton, active.
 1772.—Semiseisopochnoi smoking.
 1774.—The volcano on Tannakh-Angunakh active.
 1775.—Mount Calder and other peaks on Prince of Wales island active; also one crater on Oonimak island intermittent.
 1776.—The volcano on Sitignak in eruption.
 1778.—Ilyamna volcano active, and Shishaldin smoking.
 1784.—Vsevidof, on Oumnak island, smoking; also the Chechina.
 1786.—The volcano on Kanaga in eruption; Pavlovsky crater active; Signam and Amukhta active, the former until 1790, the latter until 1791.
 1788.—No volcanic phenomena reported, but on the 27th of July a flood submerged the islands of Sannakh and Ounga and a portion of the peninsula (evidently a tidal wave owing to earthquake).
 1790.—Akutan peak smoking; also Vsevidof, on Oumnak, the Kanaga, and Semiseisopochnoi. The Makushin, on Oonalashka, active from 1790 to 1792; and the Shishaldin from 1790 to 1825 (intermittent). Eruption reported on Prince William sound in latitude $60^{\circ} 54'$. (?)
 1791.—The peaks of Tanaga and Kanaga, smoking.
 1792.—The peaks of Sitkhan and Goreloi in eruption in May; Semiseisopochnoi smoking in June.
 1795.—Eruptions in southwest end of Oonimak, while a crater on the north side becomes extinct.
 1796.—Appearance of Bogoslov island; Edgecombe active. (?)
 1796 to 1800.—Craters on the Four Peak islands active; also Amnak island.
 1800 to 1815.—Bogoslov rising, but not smoking.
 1802.—Makushin in violent eruption—earthquakes. Bogoslov not active.
 1812.—Sarychef peak, on Atkha, very active after a long repose.
 1817.—An eruption on the north end of Oumnak with a flow of ashes and earthquake; Unaska smoking.
 1818.—Makushin, on Oonalashka, shaking; subterranean disturbances on Amnak.
 1819.—Mount Wrangell in eruption; the Rédoute volcano smoking.
 1820.—Bogoslov smoking.
 1824.—Shishaldin in violent eruption from 1824 to 1825; Unaska in violent eruption after a long repose.
 1825.—Eruptions on the northeast side of Oonimak.
 1826.—Eruptions and fall of ashes on the south end of Oonimak; the Makushin, on Oonalashka, smoking and shaking.
 1827.—The Shishaldin and the Pogromny, on Oonimak, in eruption from 1827 to 1829. The peaks on Koniushy and Kanaga smoking. In June, earthquake on Copper island.
 1828.—The peaks of Sitkhan, Akoon, Akutan, Tannakh-Angunakh, Atkha, Koniushy, Goreloi, on Oonimak, smoking.
 1829.—Shishaldin smoking; also Sitkhan, Goreloi, Tanaga, Kanaga, and Atkha smoking.
 1830 to 1831.—Shishaldin in violent eruption; also an eruption on southwest end of Oumnak and on Unaska; the Korovinsky, on Atkha island, smoking.
 1836.—Earthquake on islands of Saint Paul and Saint George.
 1838.—Shishaldin in eruption, and three other peaks on Oonimak island smoking; the Tannakh-Angunakh, the Makushin, on Oonalashka, the Akutan, the Pavlovsky crater, and another peak on Aliaska peninsula, smoking.
 1844.—The Korovinsky crater, on Atkha, and the Makushin smoking.

From this review, however incomplete, it would appear that the volcanic activity of the Aleutian islands and the Aliaska peninsula has been decreasing since the discovery of those regions by the Russians. When we consider the three classes of manifestations of volcanic activity, that is, eruption, the reduction of sulphuric deposits, and total inactivity, and apply them to the islands mentioned, we find

that in the year 1830 twelve of the islands produced sulphuric deposits, eight islands were in a state of total inactivity, and five (Unaska, Tannakh-Angunakh, Oumnak, Oonalashka, and Oonimak) were in a state of perceptible, though not always violent, uninterrupted activity.

It is also clear to the observer that certain relations exist between the alternate repose and activity at various points along the northern volcanic belt now under consideration. According to the earliest accounts of Tolstykh, Bragin, Zaikhof, Shelikhof, Cook, Sauer, Vancouver, and others, the islands of Sitignak, Kanaga, Amukhta, Kigamil, Bogoslov, Oonalashka, Oonimak, and the volcanoes of the peninsula and the Ilyamna were from the middle to the end of the last century in a state of alternate but generally decreasing activity, while the center of volcanic action apparently advanced from west to east. On Kamchatka, where from 1727 to 1731 the Kluchev was in constant eruption, and in 1737 and 1739 violent eruptions took place from the Avatcha and another volcanic peak, we find only two violent eruptions during the second half of the eighteenth century (of the Kluchev in 1762 and 1767, and of the Avatcha in 1773 and 1796). In 1820 the furnaces of Unaska, Oumnak, and Oonimak evinced renewed activity, while at the same time Mount Wrangell was in eruption. When, however, after this period, the volcanic manifestations on these islands began to decrease, the Kamchatka peaks once more opened their craters with increased violence in the years 1827 and 1829. Of late (1849) we have received no reports of volcanic phenomena on the Aleutian islands, but the Kamchatka craters are once more in eruption since 1848.

These data, vague as they are, do not furnish proof positive of a connection between these subterranean channels, but the fact that within a more limited area, as on the islands of Oumnak, Oonalashka, and Oonimak, the activity of one crater ceased when another was in eruption, points in the same direction.

The Aleutian chain of islands connects the American continent and the Alaska peninsula in the east and the Commander islands in the west as with a knotted cable that has sunk under its own weight and caused its supports or end-posts to converge on both the Kamchatkan and American coasts. Several ranges of mountains run at right angles with this chain or dam. When we look at the outward shape of the islands we find those in the west spreading and flattening toward the north and northwest, and those in the east spreading to the west and south; consequently the lifting force must have been strongest in the direction from southwest to northeast, and this has been the direction of nearly all the earthquakes within historic times.

It seems that three kinds of volcanoes are represented in the Aleutian chain: eruptive, or true volcanoes; intermittent, or partially eruptive volcanoes; and volcanoes that have risen and acquired elevation without an outbreak through the surface. All the volcanoes, with the exception of Shishaldin, have their summits covered with eternal snow. The location of craters on these peaks is as follows: On Shishaldin the crater is located on the summit of the cone; that of Khaginak is on the summit; that of Akoon is also on the summit; on Akutan volcano the old crater was at the summit, and another of later date is situated on the north slope of the peak; the crater of Makushin is located at the summit of the blunted cone; the crater of Vsevidof, on Oonimak island, is on its comb-like summit; the crater of Chegulakh is at the summit of the cone; and that of Unaska is also on the summit of the blunted cone; the Korovinsky volcano has its crater in a depression between two peaks; the volcanoes of Kanaga and Tanaga have their craters at the summit, while that of Sitkin is located on one side of the conical peak.

A majority of the volcanoes mentioned have their craters at the summit, and should consequently be true volcanoes, but we are by no means sure that all the apertures from which smoke issues are actual craters affording constant communication between the entrails of the earth and the external atmosphere. On many of the island volcanoes the appearance of smoke is due to hot springs or steam arising from cracks or clefts differing very essentially from actual volcanic craters. Where the smoking or steaming is periodical, and increasing in volume during the autumn of the year, we may presume that the constant communication with the volcanic earth beneath exists, since the voluminous atmospheric precipitation at that season of the year would penetrate to the heated strata of the earth and rise as steam from the furnace or crater.

The eruptions reported by the various observers must also be accepted with due caution; in many instances they consisted probably of ignited gases only, as several such eruptions have been described as taking place for prolonged periods on the summits covered with eternal snow. Occasionally the appearance of fire may be traced to the mere reflection of the glow of molten lava in the interior of the crater on the clouds and vaporous atmosphere above. It is true that lava, obsidian, and pumice-stone are found at various points of the Aleutian islands, but we have no description of streams of burning lava, a phenomenon which could not have failed to impress itself upon the mind of even the most careless observer. A few eruptions that have occurred within historic times consisted of ashes, stones, and liquid mud, and they seldom took place in the main craters, being apparently of a subordinate and spasmodic character. We know that sulphur is gathered from many of the craters, but the crystallization of sulphuric gas is among the weakest manifestations of volcanic activity. A majority of the Aleutian volcanoes belong to this class of sulphur-producing clefts and craters.

The falling in of mountains rising on the east coast of Bering sea, the apparent swelling and bursting of whole sections of islands—all these are indications pointing to a constant process of formation of peaks, craters, and crevices by elevation. A gradual rising is still observable on Oonimak island and the north coast of Alaska peninsula. Bering sea at its western end has a uniform depth of a hundred fathoms or more, while the eastern half is very shallow. Another point in favor of the theory that this region owes its origin more to gradual elevation than to violent eruption lies in the fact that the island of Bogoslov was not the result of eruption and piling up of debris or lava, as the island rose very slowly, and its crater was active but a very brief period of time; the elevation continued long years after all other volcanic manifestations had ceased. The only islands actually formed by accumulations of lava during eruptions in Bering sea are Saint Matthew, Saint Michael, and Stuart islands, the Pribylof group, and perhaps Amnak island.

CHAPTER IV.—HISTORICAL SKETCH OF ALASKA.

A report upon a country so little known to us as Alaska is at the present day would scarcely be considered complete without a brief historical sketch of its first discovery and subsequent development until its final fusion into the union of states and territories. For this purpose it is unnecessary to go back beyond the second voyage of discovery undertaken by Vitus Bering, who in the course of his first explorations, some years previously, had discovered the strait named after him, and proved to the world the separation of the continents of Asia and America. The so-called second northern naval expedition, fitted out in the year 1733 by order of the empress Anna, though unfortunate in nearly all its details and fatal to its commander, served to show the Russian navigators the way to unknown regions of North America and adjoining islands. The information brought back by members of the expedition, however vague and unsatisfactory, acquainted the Russians with some islands the existence of which had been exceedingly doubtful. The labors of this expedition resulted in the discovery of the North American coast in the vicinity of latitude 58°, and of the several islands of the Aleutian chain, as well as of the greater